GAS JOURNAL

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BYE-PRODUCTS.

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THE EDITORIAL CHAIR

MR. W. RUPERT KING TO SUCCEED MR. ALFRED HARRISON

CHANGES in the conduct of the "JOURNAL" which for some time have been in contemplation will take place as from March 31 next, when Mr. Alfred Harrison will retire from the Editorship. It had been intended that he should give up the more exacting part of his work at the close of 1933, but Mr. Harrison's absence in America on the Institution tour, and the consequent accumulation of work, left inadequate time for him to hand over to his successor before the end of the current volume.

Mr. Walter Rupert King, elder son of the late proprietor, Walter King, will succeed Mr. Harrison as Editor, thus following in the footsteps of his father and grandfather. Mr. Rupert King first joined the staff of the "JOURNAL" in 1912. After four years' war service followed by some years spent with an important Colliery Company in the North of England, Mr. Rupert King, already a Director of the firm, resumed more active participation in affairs at Bolt Court in 1929, in order to devote his energies to the launching of the "GAS SALESMAN" as a separate paper in the following year. The remarkable popularity and success which the latter has enjoyed pointed clearly to Mr. Rupert King's qualifications to succeed to the Editorial Chair of the "JOURNAL" itself.

Mr. Norman S. Smith, B.Sc., Assoc.M.Inst.Gas E., who joined the staff in 1923, and has been Assistant Editor to Mr. Harrison, becomes Technical Editor to Walter King, Ltd.

The Board of Directors.

From March 31 until June 30 Mr. Harrison will remain on the staff as—to borrow a phrase—"Minister without portfolio," and thereafter he will continue to retain, as a Director of Walter King, Ltd. (the Board of which he has been invited to join), a connection with the business with which he has been associated for some forty-seven years. He was appointed Editor in 1928, on the very crest of the post-war boom; and of his five and a half years of Editorship, four have been, from the point of view of the country's commercial activities, the most depressed within living memory. During that time his wide knowledge of the Gas Industry has been invaluable. This will be no less appreciated in the years to come, which all hope will prove a period of steadily growing national prosperity.

Mr. J. A. Morris has also been invited to join the Board. He joined the staff of the late Proprietor about a year earlier than Mr. Harrison, and for a long time has been known to a wide circle of friends as Advertisement Manager to the firm's publications.

CLIFFORD A. KING,
Chairman.

A Glance at the Contents—

Post Vacant.
A Gas Company in Staffordshire invites applications for the post of Assistant Works Superintendent. [p. 52.]

Statute and Case Law of 1933.
A summary is given of Statute and Case Law of 1933 as affecting gas undertakings and their officials. [p. 41.]

Gas Manager and Secretary Required.
Applications are invited by the Chard Town Council for the appointment of Manager and Secretary to the Gas Department. [p. 52.]

Waterless Holder Inaugurated at Bognor.
A waterless gasholder of the M.A.N. type, with a capacity of 1 million c.ft., claimed to be the first of its kind to be erected south of London, was formally inaugurated at Bognor Regis on Dec. 19. [p. 30.]

Private Bills for 1934.
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Supply Safeguards.
Under this heading, Mr. H. C. Widlake, A.M.I.E.E., A.M.I.Mech.E., discusses the manner in which warning devices can be used for the purpose of giving timely notice of irregularities in the functioning of gas supply systems. [p. 37.]

Assessing the Value of Gas Coals.
In an article on this subject Mr. R. A. Mott, M.Sc., suggests that, while gas engineers are justified in comparing coals on a basis of normal commercial purity, it would also be helpful both to the Industry and to the coal producers if comparisons were also made on a basis of "pure coal." [p. 33.]

EDITORIAL NOTES

Supply Safeguards

IN our columns to-day is discussed the manner in which warning devices can be employed for giving timely notice of irregularities in the functioning of gas supply systems. The author of the contribution, Mr. H. C. Widlake, has done good service in emphasizing that what may appear to some as " unnecessary gadgets " are in fact essential if the Gas Industry is to continue to enjoy its well-earned and much envied reputation for reliability. Owing to the rapid development of all forms of transport, communities formerly dwelling of necessity in a confined area find it practicable to live quite a distance from their place of employment. Large communities have sprung up in suburban areas, and this has had its effect on gas supply practice. The static process by which in the past it has been possible to maintain an adequate pressure in the old districts of supply is of little use under the new conditions, and most gas undertakings have been forced to use running plant to fulfil their obligations to their consumers. The percentage of the total output handled by running plant is steadily increasing, and the old confidence engendered by a system of static distribution can no longer be enjoyed by those upon whose shoulders rests the responsibility for uninterrupted gas supply. More and more consumers have become dependent upon the uninterrupted working of power driven plant; hence the need for a system of safeguards to furnish timely warning of any irregularity in the working of this plant.

In any such system graphic recorders play a major part. They are far more effective than many forms of human supervision. To quote Mr. Widlake, " In contrast to the conflicting reasons which discount the value of personal evidence the information afforded by the recorder chart is impersonal, unbiased, and definitely related to a time basis. It furnishes a true record of running conditions, and of sins of omission and commission, always providing that the recorder is kept locked. . . . There is about the graphic record a finality which cannot be revoked or controverted, a characteristic which is fully appreciated by plant attendants, who, in the presence of recorders, carry out their duties more carefully and with a closer regard to exact results than is the case when no such check upon their work is provided." And, as an instance of the value attaching to the use of recorders, the author refers to steam driven compressing plant, run on the throttle, and regulated according to the information afforded either by a distant pressure indicator or by reference to a pressure instruction chart setting out the varying pressures to be maintained on the outlet of compressors at all times of the day. A recorder on the common outlet main furnishes a true picture of how the engine attendant has carried out his duties, every variation in pressure being related to a time basis—a fact of the greatest value when an inquiry is being made into irregularities. Again, a record should be kept of the inlet steam pressure, to test the accuracy of the time-worn excuse that " low steam pressure caused the engine to slow-up," with an inevitable fall in the outlet gas pressure. The arguments set out by the author in favour of the use of graphic recorders in connection with the operation of compressors apply with equal force to boosting fans. And, apart from the value of recorders in ensuring a steady pressure line, they are of great utility in the early detection of mechanical faults in the plant employed. They are definitely money-savers. Mr. Widlake's article is a thoroughly practical one and will, we feel sure, prove of help to gas engineers; and we call particular attention to the author's commonsense observations on audible warning signals and stoppage alarms.

Was It a Coincidence?

THE Coal Utilization Council had a nice little boost in the *Financial Times* on Monday, and somehow it seemed natural to read, on the way up to town, surrounded by one of the foulest of the fogs that have afflicted London and its suburbs this season, that: " Within the past few weeks much evidence has been forthcoming of a definite tendency on the part of many large undertakings to revert to coal for heating purposes as against oil. There is no doubt that to a very large extent the change-over is a direct result of the fuel oil tax, but credit is also due to the Technical Department of the Coal Utilization Council. This body has been indefatigable in its efforts to promote the use of British coal. Undertakings which have lately been converted to coal from oil include hospitals, hotels, theatres, laundries, and large modern business premises. In most cases the change-over was made after the Coal Utilization Council had demonstrated the comparative cheapness and efficiency of the two fuels."

There is still ample scope for profitable propaganda on behalf of gas and a purer atmosphere.

Sulphate of Ammonia

ON a later page of this " JOURNAL " will be found extracts from the annual report of the British Sulphate of Ammonia Federation, from which it will be seen that, as a result of agreements with the most important Continental nitrogen producers and an arrangement with the Chile nitrate industry, orderly selling was introduced into most of the world's markets. A rise in prices has taken place without adversely affecting world consumption as a whole; indeed, the total demand for fertilizer nitrogen increased by 13%. The consumption of ammonium sulphate increased by 10½% to a record figure. The enormous decline in the output of sulphate in the United States of America, due to the depression in the steel industry, was even more marked in 1932, and that country, as in 1931, remained on balance a larger importer. An increase in the rate of output has, however, been noticeable since May last. Another interesting fact brought out in the report is that Japan is now practically self-sufficing for ammonium sulphate. In the year 1929-30 Japan imported 158,971 tons of sulphate from the United Kingdom; in 1932-33 the amount imported was only 3000 tons.

In regard to home consumption, this increased by 4·5%. Partly as a result of the import duty which came into force in April, 1932, foreign imports amounted to only 226 tons. Circumstances in the agricultural industry were by no means favourable to the maintenance of fertilizer sales, and had it not been for the low prices ruling for sulphate of ammonia, there would probably have been a considerable fall in consumption. That an increase was obtained is therefore to be regarded with satisfaction, and is indicative of the efficiency of the propaganda work carried out by the Federation. As to membership of the Federation, at June last this stood at 247, compared with 245 at June 30, 1932, and their production for the calendar year 1932 was 92½% of all the sulphate of ammonia manufactured in the British Isles, compared with 91% in 1931. It is pointed out that, on the production side, the recovery in prices was insufficient to check the decline in bye-product nitrogen output, which was 11% less. On the other hand, there have been cases of works which found it uneconomic to work up ammoniacal liquor at 1931-32 prices finding ammonia recovery remunerative at the 1932-33 prices.

Tariff Inducements

THE cause of those desirous of enjoying a cheaper supply of electricity—and their numbers seem to be legion—has been sturdily upheld for some time past by the *Evening Standard*, who last week returned to the fray with an interview with the Principal of a firm of house furnishers in the Borough of Chelsea. According to the report of the interview, this gentleman said: "Because of the high ordinary flat rate I entered into a two-part tariff contract with the Chelsea Electricity Supply Company. The charge was £30 a year, *plus* 1d. per unit. This standing charge was divided into £5 for each of the two summer quarters and £10 each for the winter quarters. As it was then summer time, I did not need enough electricity to use £5 worth. So in the winter I kept my shop window lights on until a later hour, and in this way used more than £10 worth a quarter. But I had to burn the shop window lights longer than was of any value for advertisement purposes if I were to get value for any standing charge." The thought occurred to him to use electricity for heating purposes, but it appeared that the premises were not wired for heating. "I inquired what the cost would be to have them re-wired, and was informed I should have to pay £40. It would have taken me a long time to get that back, so I dropped the idea. As it is, by using electric carpet sweepers, electric irons, and electric hair driers, as well as lighting in seven rooms, a shop, and the shop windows, I have actually to be extravagant in the use of electricity if I am to get down to the penny a unit, which is held out as the inducement to take the two-part tariff."

Whatever consumers may think of it, there is substantial evidence here that the two-part tariff has its advantages for an undertaking, as being a good business-getter. When all is said and done, the consumer has an alternative in the shape of a flat rate, and the arithmetical calculations involved in a choice should not be serious.

Local Government

THE past quarter of a century has witnessed several ambitious attempts by Parliament to reduce the necessity for what is termed "legislation by reference." Various Bills introduced by the Government of the day have had as their object the consolidation and codification of various then existing Statutes dealing with a particular branch of law, without, in most instances, any intention of varying the force of enactments dating back in some cases many centuries. An instance of this parliamentary process is to be seen in the placing on the Statute Book of the Local Government Act, 1933, which will come into operation on June 1 next.

As many readers of the "JOURNAL" are concerned in the administration of municipally-owned gas undertakings, and also in view of the fact that some of the largest ratepayers are the owners of gas-works, we may glance at a measure which repeals, wholly or partially, not less than 900 sections of earlier Acts, extending from an Act passed in the reign of Henry VIII. and one dating from the time of Queen Anne, down to the Municipal Corporations (Audit) Act of 1933. The Act applies to Local Authorities in England and Wales, but, except as expressly provided, excludes London from its provisions. In introducing the Second Reading, the Minister of Health (Sir Hilton Young) referred to its purpose as the "consolidation of the law of local government for England and Wales," and described it as a "great Measure of consolidation for the simplification and clarification of the law," arising out of the unanimous Report of the Committee presided over by the late Lord Chelmsford in 1930 and 1931.

This scheme of clarification is particularly noticeable in the provisions relating to the disability imposed by recent legal decisions on members of local authorities who may have a "pecuniary interest, direct or indirect, in any contract or proposed contract or other matter." In future, such persons (including members of the London County Council) will be required to disclose their interest "as soon as practicable after the commencement" of the meeting at which the matter is under discussion, and will be prohibited from taking part in the consideration or discussion of, or of voting on, such matters. The circumstances are prescribed in which a member of a local authority is to be regarded as having a pecuniary interest, but the proviso to the section renders it inapplicable to members whose "interest" in a contract or other matter may arise from his being a "ratepayer or inhabitant of the area or an *ordinary* consumer of gas, electricity, or water." It is presumed that the word "ordinary" is intended to differentiate a consumer who is also a shareholder; not to make the customary distinction adopted in the Gas Industry between such and "prepayment" consumers. In addition to these provisions, it is enacted that a local authority may, by standing orders, provide for the exclusion of a member of the authority from a meeting while any such contract or matter is under consideration. A fine may be imposed for failure to comply with the section; and it is an offence for an officer employed by a local authority not to disclose his pecuniary interest in similar circumstances. The effect of these restrictions on the rights of members of local authorities to attend and vote at meetings is applied, with modifications, to members of committees, sub-committees, or joint committees appointed by a local authority.

The Act enables a local authority, other than a parish council, to promote or oppose (on a resolution duly carried by a clear majority) a local or personal Bill in Parliament, except that no such Bill shall be promoted by a local authority for the establishment of a gas or water works to compete with any existing statutory gas or water company.

While not disturbing the effect of former Statutes regulating the expenses of local authorities, the present Act permits the payment of "reasonable" expenses incurred by members or officers of the authority attending a conference convened by one or more local authorities or by an association of such bodies for the purpose of discussing "any matter connected with the discharge of the functions of the authority." It would appear, *prima facie*, that the interpretation of these words may lead to a restricted view being taken of the class of meeting to which this section is applicable; and we should regret to think that the Legislature had it in mind in any way to exclude the conferences arranged from time to time by associations representative of public utility interests—as distinct from meetings convened solely to discuss what may be termed the domestic affairs of local authorities. The trading undertakings owned and operated by the municipalities of this country serve a distinct need, and should not be prevented from deriving the benefits obtainable by company-owned undertakings from national and local discussions and exchanges of views.

Forthcoming Engagements.

Jan. 4.—MIDLAND JUNIOR ASSOCIATION.—Meeting. Paper by Mr. T. Campbell Finlayson.

Jan. 5.—I.G.E.—Meeting of Meters Committee, 2.30 p.m.

Jan. 9.—N.G.C.—Meeting of Central Executive Board, 28, Grosvenor Gardens, S.W. 1, 2.30 p.m.

Jan. 9.—FEDERATION OF GAS EMPLOYERS.—Meeting of Central Committee, 28, Grosvenor Gardens, S.W. 1, 12 noon.

Jan. 10.—NATIONAL JOINT INDUSTRIAL COUNCIL FOR THE GAS INDUSTRY.—Meeting at 28, Grosvenor Gardens, S.W. 1, 12 noon.

Jan. 13.—SCOTTISH JUNIOR ASSOCIATION.—Joint Meeting in Glasgow.

Jan. 17.—B.C.G.A.—Meetings of Executive Committee, 11.30 a.m.; General Committee, 2.30 p.m., 28, Grosvenor Gardens, S.W. 1.

Jan. 18.—S.B.G.I.—Meeting of Council, 2.30 p.m.

Jan. 20.—WESTERN JUNIOR ASSOCIATION. — Meeting at Weston-super-Mare. Papers by Mr. K. G. Bodiley and Mr. K. L. Clark.

Jan. 26.—LONDON AND SOUTHERN JUNIOR ASSOCIATION.—Meeting. Paper by Mr. W. E. Benton.

Feb. 1.—MIDLAND JUNIOR ASSOCIATION.—Meeting. Paper by Mr. E. L. Wallis.

Feb. 16.—LONDON AND SOUTHERN JUNIOR ASSOCIATION.—Meeting. Paper by Mr. P. Lloyd.

PERSONAL

We are glad to report that Sir FRANCIS GOODENOUGH is making satisfactory progress towards recovery from the indisposition through nervous overstrain, which caused him to collapse in his office at the end of last week.

* * *

Lieut.-Col. G. S. EUNSON, of Northampton, is the subject of this week's portrait in the series of portraits of Presidents of British Chambers of Commerce appearing in *The Times* Trade and Engineering Supplement.

* * *

Tributes to Mr. IVOR G. JENKINS, who, as reported in the "JOURNAL" last week, has accepted a position on the staff of Messrs. R. & A. Main, Ltd., after serving for thirteen years as Engineer and Manager of the Abertillery Gas Undertaking, were paid at a meeting of the Abertillery Town Council at their last meeting. Mr. James Hillier, J.P., Chairman, said the Council were losing one of their most efficient officers, and they wished him every success in his new post. They were pleased to hear the staff, workmen, and consumers speak of him so highly. Other tributes were paid to Mr. Jenkins by members of the Council present. Mr. Jenkins, replying, said he had been connected with the Abertillery Undertaking for nearly 23 years, and during his period of Engineer and Manager he had seldom had any difference of opinion with the several Councils with whom he had worked. He paid a tribute to the workmen and staff, and said he was proud of being asked to act as Consulting Engineer for the next few months.

* * *

Mr. JOHN MULHOLLAND, of the Coatbridge Gas Company, has been appointed to the position of Laboratory Assistant at East Hull Gas-Works. Mr. Mulholland commences his duties there early in the New Year.

THE NEWS OF THE WEEK

The Output of Gas in Rotherham reached a record of 4¼ million c.ft. on Wednesday, Dec. 20. Three years ago the maximum output was only 2¾ millions.

An Electricity Failure at Porthcawl on Dec. 28 lasted for five hours—from 4.30 p.m. till 9.30 p.m.—and caused considerable disorganization in the town. Several entertainments and other functions had to be postponed or cancelled. A party for the children of the unemployed, given by the Porthcawl British Legion, was, however, unaffected, gas lighting being employed.

A Christmas Party.—Richmonds Gas Stove Company's Recreation and Social Club at Warrington held the Annual Christmas Party for all the children of the employees on Thursday last, Dec. 28, at the Parr Hall. This event, which is a voluntary effort by the Committee and members of the Recreation Club, has now been held for several years, and naturally is keenly anticipated and much enjoyed by the children, between 500 and 600 being present last Thursday.

A Remarkable Progress Report was given to the Halifax Corporation Gas Committee at a December meeting, arising out of an exhibition of gas appliances held at the Marlborough Hall in October-November. When the exhibition was opened on Oct. 30 there were orders on hand for 303 installations of gas appliances. Since then 3529 additional orders had been received, making a total of 3832 in seven weeks. The staff, it was reported, had been increased, and fitters were working overtime in fixing the newly-ordered appliances. Owing to increasing demand for gas, the Committee decided to lay new mains in Burnley Road, Huddersfield Road, Ovenden Road, and Wakefield Road at Lightcliffe, at a cost of £10,000.

Special Courses at Leeds University.

In connection with the work of the Fuel Department at Leeds University, arrangements have been made for the delivery of Special Courses of evening lectures.

"Carbonization Practice" will be dealt with by Mr. R. Dally, British Gas Light Company, Ltd., Hull, in four lectures on Jan. 29 and Feb. 5. Dr. F. J. Dent, Research Chemist, Institution of Gas Engineers, will give two lectures on "Water Gas Practice" on Feb. 12; and Mr. H. Hollings, of the Gas Light and Coke Company, will discuss "Gas Purification Practice" in six lectures on Mondays, commencing Feb. 19 and concluding on March 5. The fee for the whole course is £1, but the sections can be taken separately at 10s., 5s., and 12s. 6d., respectively.

"Refractory Materials" forms another course, which consists of eight lectures by Prof. J. W. Cobb on Tuesday evenings commencing on Jan. 16 and concluding on Feb. 6; and four lectures by Dr. A. L. Roberts (Feb. 13 and 20). Fee for the whole course, 17s. 6d.; for the separate sections, 15s. and 10s.

Mr. H. J. Hodsman will give two lectures on "Domestic Fuel" on Feb. 27 (fee 5s.).

"Engineering-Metallurgy" is in the hands of Mr. A. Preece. The course consists of six lectures on Wednesdays commencing Jan. 17 and concluding Feb. 21 (fee 15s.).

There is also an Evening Laboratory Course conducted by Prof. Cobb, Mr. Hodsman, and Mr. Preece. The laboratory of the Department will be open on Wednesday evenings from Jan. 17 to Feb. 21 for a limited number of students who have already received some chemical training but who desire instruction in Fuel Calorimetry and Pyrometry. More advanced students, capable of independent work, may also be admitted to the laboratory during those periods (fee 15s.).

Gas for Tomato Growers.

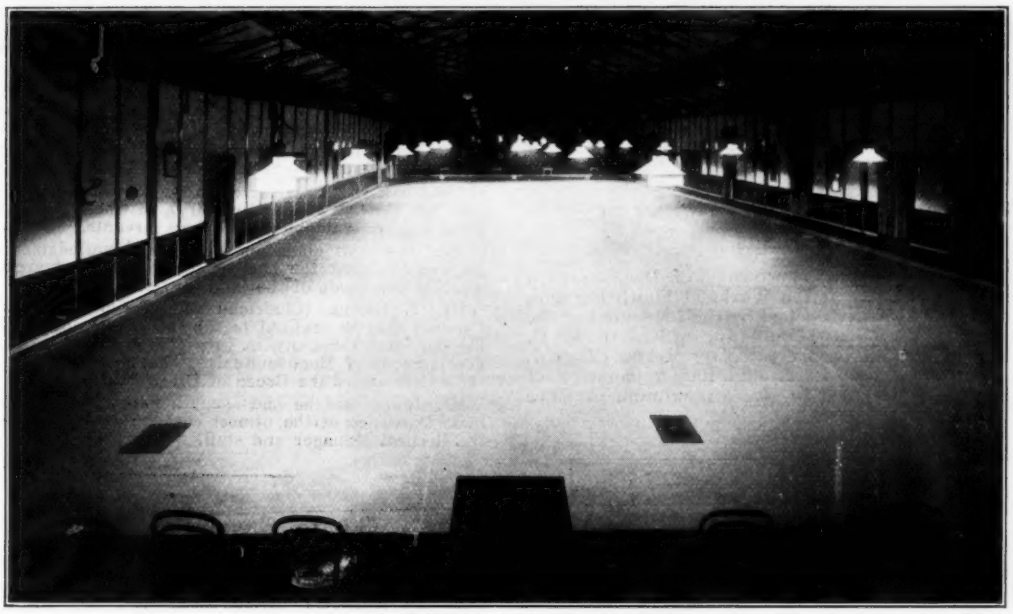
New Project in the Glasgow District.

Statutory powers are being sought by the Clyde Valley Gas Supply Company for supplying gas to an extensive area in Lanarkshire.

The new Company in which the MacLaurin Coal Products, Ltd., are interested, propose to supply gas for the heating of tomato houses of which there are a large number in the district. Tomato growers have been approached and have expressed themselves in favour of the new scheme which will displace the present system of heating by anthracite or semi-anthracite stoves. It is estimated that the gas will be supplied at 2·5d. to 3d. per therm and will also be available for domestic purposes.

It is intended by the Company to erect smokeless fuel plant adjacent to Woodside Colliery, Lanarkshire. The plant will work on the MacLaurin system of low-temperature carbonization and will be similar to that until recently in use at Dalmarnock and still in operation at Nuneaton, Warwickshire. It is expected that there will be a continuous demand on the plant over 24 hours, as the domestic supply during the day will be followed by the demands of the tomato houses at night. This balanced output will make for more profitable working, and it is confidently expected that a market will be found for the normal by-products of the MacLaurin plant—smokeless fuel, oil, and ammonia.

Gas Lighting of a Bowling Green



The Isle of Thanet Gas Light and Coke Company have recently fitted up an indoor bowling green at "The Casino" with gas lamps, which, as will be seen from the accompanying photograph, give a remarkably uniform illumination on the "greensward." The size of the "green" is 126 ft. long by 51 ft. wide, and is capable of accommodating three separate rinks, each of which is lighted by its own row of lamps under separate control. There are 20 lamps of Sugg's "Swanley" type, with special reflectors, the end ones being fitted with eye-screens. The two end lamps to each rink consist of six lights, while the intermediates have only four lights, each being 7 ft. 6 in. above the level of the green. Those who have made use of the rinks are enthusiastic in their praise of the uniformity and softness of the illumination afforded, and, in addition, the atmosphere is comfortably warmed by the lamps. This view is expressed not only by bowlers in Margate but by those of other clubs who have visited it for the purpose of playing matches.

Gas in the Ideal Home.

Our photograph is of the Sheffield Gas Company's stands at the Ideal Homes Exhibition which was held in Sheffield from Dec. 2 to 13. The exhibition was unique in that it was the first occasion the new City Hall of Sheffield has been brought into use for such a purpose. The stands were divided into three sections—the first devoted to gas cooking appliances, the second to gas heating appliances, and the

Sheffield Gas Company's Display.

third to a miscellaneous display of appliances, including modern hot water apparatus. The lighting arrangements were much admired during the run of the exhibition, and more particularly the gas pylons and the special chromium-plated outdoor lamps which could be operated for demonstration purposes by distant control devices and taps.

Extensions to Messrs. Cochranes' Foundry.

To provide the necessary space for the extension and development of their spun and cast iron pipes and general foundry developments, Cochranes (Middlesbro') Foundry, Ltd., Ormesby Ironworks, Middlesbrough, have decided to dismantle the blast furnace plant, containing, in all, three blast furnaces with the necessary stoves and auxiliary plant.

The space at present occupied by the above plant will enable the present foundry equipment to be extended on up-to-date lines.

Trade Outlook Brighter.

New Year Message from the Secretary of the Department of Overseas Trade.

"I consider that the outlook for British trade is brighter to-day than it has been for some time," says Lieut.-Col. John Colville, M.P., Secretary of the Department of Overseas Trade, in a New Year Message. "Even the worst years have brought their opportunities. The year 1934, which promises to be an improvement upon its immediate predecessors, will find Britain's industries alert to make use of improved conditions.

"A good indication of the condition of Britain's many industries is the British Industries Fair, and it is significant that the next Fair, which opens at Olympia and the White City, London, and Castle Bromwich, Birmingham, on Feb. 19, will bring together a bigger and more varied range of British products than has ever been assembled before.

"The Fair will show that British prices are competitive and that adaptations and improvements carried out in the

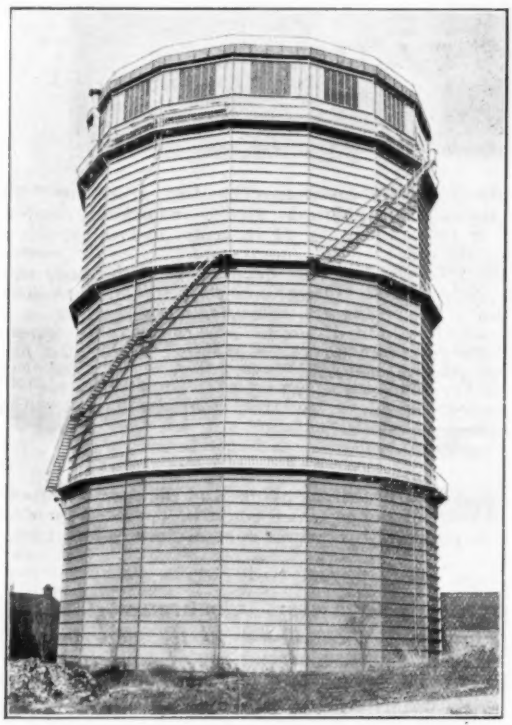
THE NEWS—continued.

lean years have equipped Britain's industries to supply just those goods which market conditions demand. Already there is evidence of interest of overseas buyers in the 1934 Fair and a record number of Continental countries have agreed to arrange for reduced travel rates to encourage attendance by their trade buyers.

"There are yet many difficulties to be surmounted in international trade," concludes the Message, "but I believe that trade revival has begun and that Great Britain is in a position to lead that revival."

Inauguration of M.A.N. Holder at Bognor Regis.

An interesting ceremony was performed on Dec. 19, when a new waterless gasholder at the Works at South Bersted, Bognor Regis, was formally opened by the Chairman of the Bognor Gas and Electricity Company, Alderman J. D. Denton. The holder has been erected by Messrs. R. & J. Dempster, Ltd., of Manchester, and has a capacity of 1 million c.ft. It is designed to give a maximum pressure of 12 in.



The New Waterless Holder at Bognor.

The holder has been erected on foundations built by the F.C. Construction Company, Ltd., of Derby, and is supported by, and anchored to, reinforced concrete piles driven down to a depth of 72 ft.

At a subsequent luncheon at the Royal Norfolk Hotel, Alderman DENTON, Chairman of the Company, who presided, submitted the toast of "Messrs. R. & J. Dempster, Ltd." He said that he had known that eminent firm for many years. The new waterless holder was the first of the kind erected south of London. Circumstances had altered a great deal since he joined the Board forty or fifty years ago, and he was proud to reflect upon the manner in which the Company had responded to the growing demands first of the little town, then of Greater Bognor and its expanding environs. With regard to the toast, the guests assembled wished Messrs. R. & J. Dempster, Ltd., continued prosperity and an increasing clientele, and that Mr. J. Winson Scott, the genial Managing Director, might enjoy good health.

Mr. J. WINSON SCOTT, responding, said he was delighted to be there on that occasion, because it marked an event that would be a credit not only to his firm, but also the Bognor Company. He was glad to renew acquaintance with their Vice-Chairman (Mr. T. N. Ritson), whom he had known in the 'nineties, when a gas engineer in the North. The erection of the holder made one realize the progress Bognor Regis had made. On such a site as theirs at South Bersted, where piles had to be sunk so deep, the erection of a waterless holder was ideal and a wise precaution on the part of the Directors. Mr. Scott also referred to the fact that the family of Mr. W. W. Hammond (Engineer and General Manager of the Gas Company) had been connected with the Gas Industry for three generations. He (the speaker) appreciated the kindly consideration extended throughout the progress of the work to Mr. Joyce, his firm's erector. In conclusion, he asked Alderman Denton to accept a silver salver with the best wishes of Messrs. R. & J. Dempster, Ltd., to commemorate the inauguration of the holder.

Alderman DENTON said he accepted the souvenir with the greatest of pleasure on behalf of himself and co-Directors.

Mr. T. N. RITSON remarked that the new holder would ensure a constant gas pressure.

Alderman DENTON referred in warm terms to Mr. Hammond and Mr. F. G. Watson (Secretary), in whom, he said, the Company had two valuable and zealous servants.

Mr. HAMMOND made appropriate acknowledgment. He said he was confident the new holder would be of great utility in meeting the needs of the large district.

Mr. J. CAIGER (Chairman of the Bognor Urban District Council) said he realized to the full the important steps taken by the local Company in providing gas plant for the future development of Bognor Regis. The new holder demonstrated the enterprise of the Board of Directors.

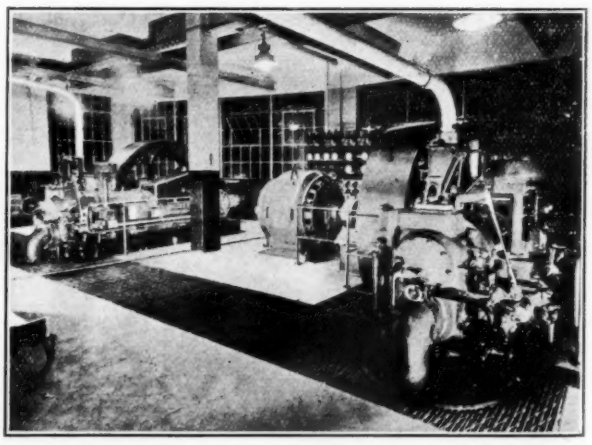
Mr. JOYCE said he had spent a happy time in Bognor, and had experience of the utmost consideration and kindness from the General Manager and staff.

Gas for Generating Electricity.

The Derby Gas Light and Coke Company recently installed twin electric generating sets on the premises of the Midland Drapery Company at Derby. These premises constitute the largest drapery stores in the town, and the lighting account runs to £1600 to £1800 per annum. It is a peculiar fact that firms of this kind generally have to pay the highest rates for electricity while a small consumer using, say, a ½ h.p. motor for peeling potatoes in a fish shop gets his current at a fraction of the price.

As a result gas driven generators have been installed, and the saving is already so considerable that the Midland Drapery Company now regret that they did not transfer the load years ago.

The power house was designed by Messrs. Arthur Eaton & Son, Architects, of Derby, and consists of a reinforced steel skeleton structure panelled with pressed red bricks to match the main building. The engine foundations are isolated from those of the building. The units themselves consist of two horizontal single-cylinder town gas engines, each of 107 b.h.p. direct coupled to D.C. 230 volt generators, each having an output of 70 kw. A three-panel switchboard controls the supply to the distribution stations on the Drapery Company's premises.



Gas Driven Generators.

Silencing and vibration received special consideration when arranging the general lay-out. The starting is by compressed air controlled by a separate gas engine of 3½ b.h.p.

In addition to the power units described, the outside lighting has been improved by the addition of twelve 1000 c.p. Keith high-pressure lamps. These are supplied with gas from a high-pressure main direct from the Gas Company's Cavendish Street Works.

NEW SHOWROOMS

AT

BARROW-IN-FURNESS

MEETING COMPETITION

VIEW OF GROUND FLOOR OF THE NEW BARROW SHOWROOMS.

Although the Barrow-in-Furness Corporation Gas Showrooms in Cavendish Street, Barrow, were only opened on Dec. 7, the amount of business since transacted gives the assurance that the venture is much appreciated by the townspeople and will be profitable.

The new showrooms are on a small scale, yet sufficiently large to be extremely useful for the advertising and demonstration of the modern uses of gas.

In his annual report to the Gas Committee last March, Mr. Claude Diamond, the Manager, wrote: "138 additional meters have been fixed, as compared with 86 in the previous year; 85 additional cooking stoves have been fixed; and there have been 83 new type cookers sold on the hire-purchase system, and 46 sold outright. Owing to the absence of showroom accommodation it has not been possible to bring this class of cooker before the public as it otherwise would have been, and yet, although handicapped in this respect, our sales have been very satisfactory, the total value of the apparatus disposed of being £1593."

Here was the evidence of the pronounced need for showrooms in a borough in which there are 15,508 gas consumers. At the end of the first week of the showrooms, Mr. Diamond, when interviewed by a "GAS JOURNAL" representative, said that the first week's business had been very satisfactory and augured well for the future.

At the showrooms, which comprise ground and first floor in premises in Cavendish Street, on the opposite side to the Barrow Corporation's Electricity Offices and Showrooms, the visitor is at once impressed with the example of what a little care in the selection and positioning of fittings can do towards demonstrating that gas can be beneficially utilized in many directions.

The rooms have been made tasteful by oak panelling and oak furnishings, and the fine large windows, both upstairs and down, in Cavendish Street enable the prospective customer to see apparatus in the best of light in the day time and in the best of gas light after dusk. The display of lighting fittings will stimulate inquiries for alterations in the lighting of many homes. Here also on the ground floor are displayed various types of the latest gas cookers and heaters. Upstairs is a fine display of the latest cookers.

The entire fitting out of the showrooms, the panelling in oak, &c., is the work of the Gas Department and reflects credit on the staff. On the first floor is an important section demonstrating water heating by gas. The visitors see the automatic water heater for every purpose. Gas wash-boilers and various other appliances are also on view. The showroom, in brief, is an important addition to the activities of the Corporation Gas Department.

Aluminium in Architecture and Decoration.

A remarkably attractive brochure illustrative of some of the varied applications of aluminium and its light alloys in architecture and decoration has recently been published by the British Aluminium Company, Ltd., of Adelaide House, King William Street, E.C. 4. Instances are illustrated in which aluminium and its alloys have been used for architectural purposes in Great Britain, Europe, and America, it being in the last-named Continent that aluminium has, perhaps, found the widest application in this particular field. An impressive photograph is included of the Empire State Building, New York—the tallest man-made structure in the world, being 1250 ft. high. And those of our readers who had the opportunity of seeing this vast edifice on the occasion of the recent tour of the Institution of Gas Engineers and those who read the Editor's descriptive note regarding the building in the "JOURNAL" for Nov. 15 (when we published a photograph of it) will be interested to know that it carries 380 tons of aluminium in the form of spandrels, store fronts, marquises, elevator doors, mooring mast, and other details.

Other beautifully produced illustrations in this brochure range from the statue of Eros, which has successfully withstood the London atmosphere for 40 years, to the *Daily Express* building in Fleet Street and the Radio City, New York; from the interior decorations of a private drawing-room to the entrance halls of public buildings. Aluminium finds many applications in the Gas Industry, and further illustrations show the gas stand with its aluminium "Plymax" fascia at the last South London Exhibition at the Crystal Palace, and the premises of the Consumers' Gas Company at Toronto, showing spandrels, clock case, window sashes, and lettering in aluminium sheet.

Early Gas Apparatus.

We have received from Messrs. W. C. Holmes & Co., Ltd., of Huddersfield, a copy of the first issue of a new series of "pioneer" subjects for their Calendar. This series will deal with individual pieces of apparatus which form the basis of the means of coal carbonizing and gas purification and distribution.

As far as possible the illustrations will be photographic reproductions of original drawings of the early engineers responsible for the design of such apparatus, and the descriptive matter of their composition.

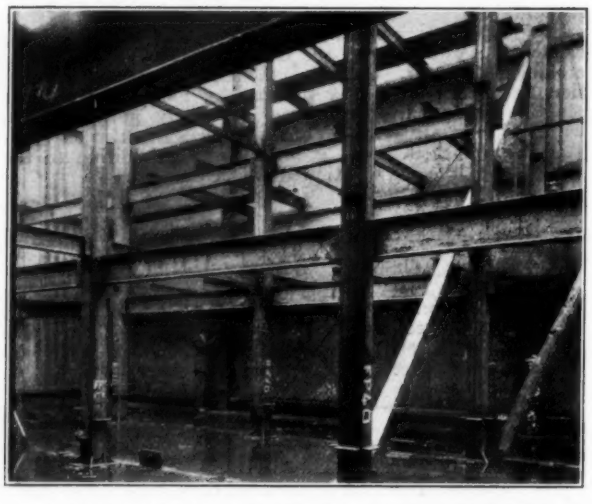
The first of the series, covering January-March, is a drawing used by Murdoch for the gas-works built at the cotton mills of Messrs. Phillip & Lee at Manchester, and the matter is extracted from his "Account of the application of the gas from coal to economical purposes" communicated to the Royal Society on Feb. 25, 1808. The drawing is reproduced in the form in which it appeared in "The History of the Introduction of Gas Lighting," by the late Charles Hunt, published in 1907 by Mr. Walter King.

THE NEWS—continued.

A Revolution in Purifier Construction.

Recently we visited the works at Stockton-on-Tees of Messrs. Ashmore, Benson, Pease, & Co., Ltd., to see a remarkable development in purifier construction. The purifier we inspected—it is the first box of a contract for twenty-four boxes of like capacity—is an all-welded construction of mild steel; and its erection speaks volumes for the resources of the firm by way of both personnel and plant. The design and method of construction are quite a departure in purifier practice. The size of each box is 35 ft. square and 23 ft. deep, designed for four layers of oxide each 3 ft. 6 in. deep. Grids of the flat bottom type will be used, with one layer of lightening grids per tier. The test pressure of the box is 2 lbs. per sq. in., and, on a normal gas-works basis, each box will contain oxide for dealing with approximately 3½ million c.ft. of gas per day.

View of Assembled Box in Makers' Works.



Interior View, Showing Bearer Standards and Supporting Joists.

As mentioned, there will be twenty-four boxes, and these will be arranged in three sets of eight in double file corresponding to a total capacity of about 84 million c.ft. of gas per day. The completed installation will have a sub-structure 18 ft. in height, so that the top of the box will be a matter of 41 ft. from ground level. A crane gantry will be erected with extensions at both ends of the boxes, with an overhead crane for loading the boxes by means of a grab. Each box will, of course, be provided with oxide outlets. Some idea of this engineering achievement will be gained when we mention that the contract involves 2500 tons of steelwork and over 60 miles of welding.

The work, which is being carried out for the Billingham Factory of I.C.I. (Fertilizer and Synthetic Products), Ltd., will provide employment one way and another for round about 200 men over a period of six months.

Royal Leamington Spa.

Facilities for B.I.F. Visitors.

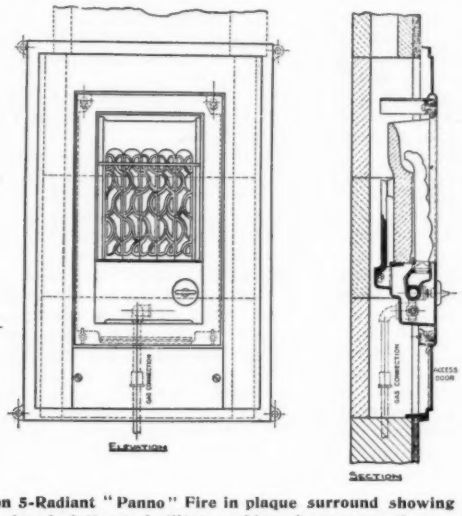
Members of the Gas Industry have on previous occasions gained benefit by obtaining accommodation at Leamington Spa in connection with their visits to the Castle Bromwich Section of the British Industries Fair, its general convenience and proximity to the Fair by rail being much appreciated.

A booklet, which is obtainable from the Spa Manager, Publicity Department, Royal Pump Room and Baths, Leamington Spa, draws attention to the very good selection of hotels and other facilities which the town is able to offer. Copiously illustrated, this booklet sets out the advantages of Leamington both as a health resort and as a residential town, and gives much interesting information in regard to the Spa itself and the surrounding neighbourhood.

Fitting Up Panel Fires.

A Parkinson Innovation.

To facilitate the work of the gasfitter, in connecting up "panel" type fires, in which the running joint is often difficult to make owing to the fire fitting flush with the wall or plaque surround, the Parkinson Stove Company, Ltd., of Stechford, Birmingham, are supplying standard cast iron plaque surrounds with access doors below the fires. These are available for their "Panno" and "Welwyn" (panel type) fires.



Parkinson 5-Radiant "Panno" Fire in plaque surround showing access door in latter to facilitate making of gas connections.

To take off the access door it is only necessary to remove two screws; ample space is available in the chamber behind the door for the fitter to make his gas connection.

The Parkinson Access Door will be appreciated by gas undertakings and builders, as it simplifies the work of the fitter in connecting and disconnecting the gas supply to the fire.

Gas Propaganda in Sheffield.

The Gas Industry each year receives good publicity at the hands of the Sheffield Gas Company through the medium of the Trade and Industrial Supplements of the *Sheffield Daily Telegraph* and the *Daily Independent*.

The present occasion is no exception, and these two publications, appearing at the end of the year just concluded, tell the tale for gas and its progress during the year in a remarkably effective manner. The research work and enterprise of the Sheffield Company are amply evidenced in the articles, both of which refer to the experimental work and long-range investigations carried on at the Company's fully-equipped laboratories for the purpose of co-operating with manufacturers in the solution of the many difficulties experienced during heat treatment and re-heating processes which are vital to the existence of Sheffield industries.

Well known in the Gas Industry, of course, is the Company's Furnace Demonstration Room, which is one of the most modern in the country; and it is interesting to note that the large number of firms who have visited the Demonstration Rooms of the Research Department leaves no doubt that the free services offered by the Undertaking are greatly appreciated. In addition, a series of

lectures has been given during the year to the Sheffield Trades Technical Societies on the use of gas in industry.

Reference is also made to the fact that 1600 gas street lamps are in use in the city area of Sheffield alone, while during the year a considerable number of extra lamps were erected by the Company in outlying districts. The domestic side was not forgotten, details of the advantages of modern appliances for use in the home being set out. Mention was also made of the opening of a most up-to-date kitchen at the new headquarters of the Sheffield Refreshment Houses, Ltd.—probably the largest kitchen in Sheffield—and all the apparatus is heated by gas.

Assessing the Value of Gas Coals

By R. A. MOTT, M.Sc., F.I.C.

The long-continued use of coals for gas making in this country has enabled a rough classification of coals to be made, and, in general, the most suitable coals fetch a higher price. Nevertheless there are many unsatisfactory features in the present commercial classification by reputation (based on results) and it is desirable if possible that a more rational system of classification should be employed which would render clearer to both producer and purchaser the factors which are of importance. Such a classification should render the comparison of coals from different areas a simpler matter, and could simplify the classification of gas (and other) coals which is necessary under the Coal Mines Act (1930).

Reference to published records of tests made by gas makers snows that the comparison of different coals is obscured by the varying bases adopted. Tests made in vertical retorts are particularly difficult to compare owing to the varying percentages of steam used in different tests, and, therefore, the varying calorific values of the gas. A production of over 100 therms of gas of 450 B.Th.U. per c.ft. is of no interest to a gas maker who has a declared value of 475 or 500 B.Th.U. In all tests, reports based on the use of coal of varying moisture content are liable to be misleading. Similarly, the comparison of two coals may be obscured by the varying amounts of ash and sulphur. Although it is fair to make comparison between the thermal yields from coals of normal commercial purity—that is, containing the average amount of ash and sulphur—varying amounts of moisture may be due to circumstances over which the coal producer has no control; for example, varying weather conditions. Comparison between washed nut sizes of coal could at least be made on a uniform moisture basis, for, when given the chance, water (from washing processes or rain) will drain away to practically the same extent for the same sizes of different coals. Consignments of gas coal which include much smalls will naturally vary in moisture content, according to the percentage of different sizes present, whether the coal has been wet-washed or dry-cleaned, and according to the weather and also the transport conditions to which the consignments have been subjected.

The writer suggests that, while gas engineers are justified in recording comparisons between different coals on the basis of normal commercial purity, it would also be helpful to the Industry as well as the coal producers if comparison were also made on a basis of "pure coal." Records of the gas-making properties on a pure-coal basis would enable a clearer picture for the relative gas-making values of coals from different sources to be made, could indicate variations in blending of different coals in proprietary gas coals, and would also serve to elucidate the properties of coals which are of most value to the gas maker. It is in order to demonstrate this that this article is prepared.

All gas makers are aware that variations in size of coal influence the rate at which gas is produced, the ease of working the retorts, the quality of coke, and also the thermal yield and calorific value. This influence has been carefully established in Fuel Research Technical Paper No. 26 (The Influence of Size of Coal During Gas Manufacture, 1930), another variable, the "caking power," being also considered. Very little attention has, however, been given to the influence of the rank or type of coal or the value of a coal to a gas maker, and the descriptions of coals in most articles and books on gas manufacture are elementary. Recourse is usually made to descriptions such as Durham coal, Yorkshire gas nuts, or to more particular titles such as Wear Specials, Gas Seconds. The more particular titles, taking into consideration the coalfield where the coal was mined, are certainly indications of quality to a gas engineer, but the term "Yorkshire gas nuts" gives little indication of the thermal yield to be expected. Most gas engineers have discredited the use of the volatile matter as a general index of the value of a gas coal. It is known that a low volatile coal, with under, say, 30% of volatile matter on an ash-free, dry basis, is not generally as good a gas coal as one of higher volatile content, but there is no direct relationship between volatile matter and gas-making value for various British coals. On the Continent more importance is attached to the volatile matter as a distinguishing mark of a gas coal for the reason that low volatile coals are the most abundant and some distinction from these is required.

The "Rank" of English Coals.

The rank of English coals, or their degree of coalification, cannot be shown by volatile matter tests. In South Wales only of the British coalfields are low volatile coals found, and, apart from this area, coals of over 30% volatile matter are found in all coalfields. There are, however, marked differences in the rank of coal from different coalfields disclosed by ultimate analyses, or by determinations of calorific value, which for comparison must be calculated to a basis free from ash and moisture which are chiefly adventitious materials, not associated with the pure coal. The rank of coals in different coalfields may be illustrated from analyses published by Grumell (Trans.Inst.Min.Eng., 1931, 81, 214) as follows:

Coalfield.	Calorific Value (B.Th.U./Lb.) of Dry, Ash Free Coal.		Range of Carbon Content of Dry, Ash Free Coal.
	Range.	Mean.	
Durham	15,600–15,200	15,400	89–84·5
South Yorkshire	15,500–14,500	15,000	87–80·5
Lancashire	15,400–14,500	14,950	86–81
Northumberland	15,200–14,300	14,750	86–82
North Staffordshire	15,000–14,400	14,700	84–80·5
Derbyshire	14,800–14,300	14,550	83–81
Nottinghamshire	14,800–14,100	14,450	83–80
Warwickshire	14,300–13,900	14,100	81–79
Leicestershire	..	14,100	80

Ranges for maximum and minimum may be misleading, but the mean values for calorific value may be taken as a fair guide of the average rank of the coal in the coalfields named. The ranges show that the coals in Durham are all of relatively high rank, while those from Warwickshire, for example, are all of low rank. A high calorific value of the dry, ash-free coal (assuming that the sulphur and nitrogen contents of coals in different coalfields do not vary much, a reasonable assumption) indicates a low oxygen content in the pure coal. In all coalfields except Warwickshire and Leicestershire, of those mentioned, coals of over 14,750 calorific value or over 82% carbon content may be obtained, and all such coals may be used as gas coals.

The requirements of a gas coal are, first, that it should give a high thermal yield of gas, but this should preferably be of high calorific value so that dilution of the straight gas coal with water gas may give a still higher yield of gas of the calorific value required. A second requirement is that the coal should yield a good coke with a small proportion of breeze. A high tar yield is also advantageous. The coal should also not be too strongly swelling to give difficulties in working in continuous vertical retorts. Put in a simple sentence, it may be said that a gas coal must give a large yield of volatile matter of high calorific value, and must have moderate swelling power. A strong swelling power leads to sticking in vertical retorts and a low swelling power to imperfectly-formed coke or a weak coke with much breeze. Swelling power is a simpler concept than caking power and has a direct connection with ease of handling coal in vertical retorts and with the quality of coke produced.

Relations between Rank of Coal and Swelling Power.

The relationship between swelling power and the rank of a coal is illustrated in fig. 1, the swelling power being measured in the Sheffield Laboratory Coking Test (fig. 2) at a standard rate of heating—namely, 1° C. per min. It will be noted that all coals containing over 81% carbon

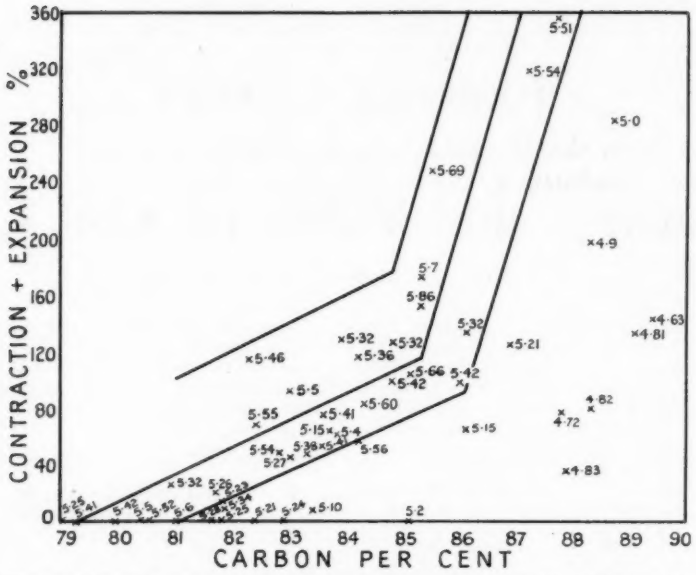


FIG. 1.—RELATIONSHIP BETWEEN SWELLING-POWER AND CARBON CONTENT OF COAL.

The figures near each cross are the hydrogen content (dry, ash-free basis).

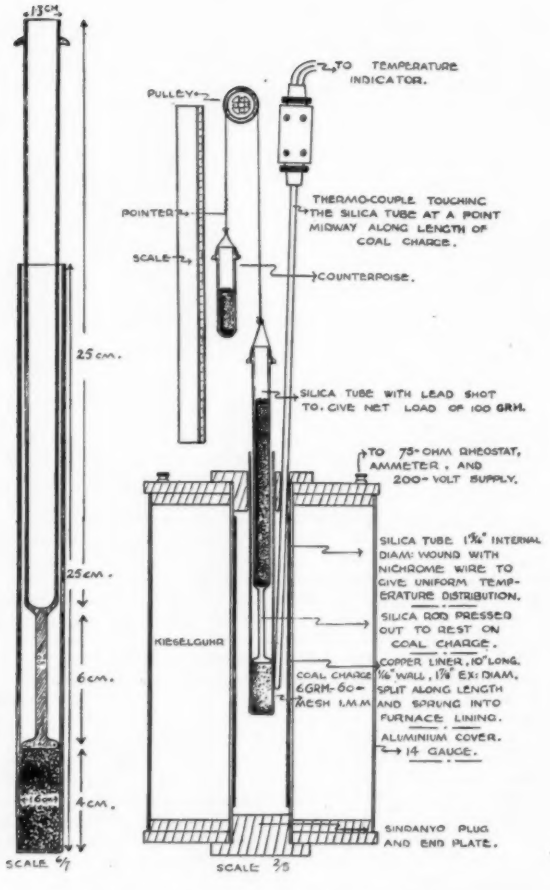

13cm.
TO TEMPERATURE INDICATOR.
PULLEY
POINTER
SCALE
THERMO-COUPLE TOUCHING THE SILICA TUBE AT A POINT MIDWAY ALONG LENGTH OF COAL CHARGE.
COUNTERPOISE.
25cm.
SILICA TUBE WITH LEAD SHOT TO GIVE NET LOAD OF 100 GRM.
TO 75-OHM RHEOSTAT, AMMETER, AND 200-VOLT SUPPLY.
SILICA TUBE 1¾" INTERNAL DIAM: WOUND WITH NICHROME WIRE TO GIVE UNIFORM TEMPERATURE DISTRIBUTION.
SILICA ROD PRESSED OUT TO REST ON COAL CHARGE.
KIESELGUHR
COPPER LINER, 10" LONG. ⅛" WALL, 1⅞" EX: DIAM, SPLIT ALONG LENGTH AND SPRUNG INTO FURNACE LINING.
COAL CHARGE 6GRM-60-MESH I.M.M.
ALUMINIUM COVER.
14 GAUGE.
25cm.
6cm.
4cm.
SINDANYO PLUG AND END PLATE.
SCALE ½
SCALE ⅓

Fig. 2.—Diagram of the Sheffield Laboratory Coking Test Apparatus.

and 5·25% hydrogen (dry, ash-free basis) are swelling coals, the swelling increasing with increase in carbon, very rapidly above 85% carbon. The main band in the graph includes coals which are generally of 5·25 to 5·45% hydrogen content, but for hydrogen contents below 5·25% the swelling is below the normal for a given carbon content. Coals of high carbon (87 to 88) and high hydrogen (over 5·5) are very strongly swelling and would be difficult to use in continuous vertical retorts. There are a number of coals of high carbon but very low hydrogen content—the Welsh steam coals—on the graph, but these would not be used for gas manufacture owing to their low thermal yield. As a rough guide it may be suggested that all coals over 87% carbon content (dry, ash-free) and over 5·45% of hydrogen would be difficult to use in vertical retorts owing to their strongly swelling nature.

At the other end of the scale, coals of under 82·5% carbon (dry, ash-free) unless of high hydrogen content (over 5·45%) would yield large proportions of breeze and inferior cokes, because of their low swelling powers. A moderate swelling power is necessary to enable different particles of coal to be agglomerated into a homogeneous coke.

Relation between Rank of Coal and Gas Making Ability.

The relationship between the rank of coal and its thermal yield has received only isolated investigation. An interesting series of tests has been reported in the Canadian Department of Mines paper, "Classification of Coals using Specific Volatile Index," by Burrough, Swartzman, and Strong, Ottawa, 1932. The tests reported were made in a 2-ton experimental coke oven. The results for which ultimate analyses are also recorded are reproduced in Table I. It should be noted that in these records the ultimate analysis has been calculated to a dry, ash and sulphur free basis, to avoid the anomalies due to varying sulphur content.

Table I.—*Bye-Product Yields from Different Coals.*

[Canadian Department of Mines.]

Coal.		Gas.		Tar.	Coke.		
Carbon. Dry, Ash and Sulphur Free.	Hydrogen. Dry, Ash and Sulphur Free.	Therms per Ton of Dry, Ash and Sulphur Free Coal.	Calorific Value B.Th.U./C.Ft.	Gallons per Ton. *	Weight % *	Shatter Index.	Apparent Specific Gravity.
77·5	5·2	69·8	460	3·3	60·0	..	..
80·5	5·5	75·6	540	5·3	64·1	..	..
80·7	6·0	81·0	560	6·9	62·4	..	..
83·4	5·6	83·4	570	10·2	61·5	..	..
84·3	6·0	78·9	575	11·3	65·0	30	0·85
85·8	5·9	78·4	567	9·8	68·0	63	0·95
86·0	5·4	79·1	630	10·6	67·2	..	..
86·5	5·8	76·4	565	10·2	67·3	53	0·90
86·5	5·8	77·8	584	11·3	67·8	52	1·00
86·5	5·5	77·3	556	10·2	69·2	..	..
87·4	5·2	70·1	555	10·2	71·1	71	1·00
88·0	5·4	65·5	550	6·9	77·3	76	1·08
88·1	5·3	71·5	556	8·0	75·0	70	0·93
92·9	4·3	60·0	535	3·1	84·8	..	..

* Dry ash-free coal.

These results show maximum thermal yields for coals of 80·5 to 83·5% carbon (dry, ash and sulphur free) with a rapid drop in thermal yield for coals of lower rank, but with a slower drop with increase in rank until the carbon content exceeds 86·5%. The calorific value of the gas falls for coals below 80·5% and above 87% carbon content. The tar yield falls for coals below 83% and above 88% carbon. The coke is weak for a coal of 84% carbon (and probably those of lower carbon content).

(To be concluded.)

Refractory Materials

Written Contributions to the Discussion on the 24th Report of the Refractory Materials Joint Sub-Committee presented at the Fifth Autumn Research Meeting of the Institution of Gas Engineers.

Mr. H. J. Toogood: Flaking, the paramount problem of the moment, may with advantage be considered under the three P's: Pressure, Porosity, and Permeability. It is well established that scurf deposit, whether as to thickness or hardness, is very closely bound up with the pressure-condition maintained at all times within the retort. Hence the user, to mitigate flaking, should choose his coals, and the stoker should so work the retort that there exists a continuity of descent of the charge, and thereby maintain the minimum pressure and the least degradation of of gas, the reduced formation of scurf of the softest variety, and with the minimum adherence to the retort sides.

As to the porosity of the refractory material, this is a function for the manufacturer, and when all is said and done in the improvement of to-day's much improved refractory materials, there is still a word which can be said with prospects of advantage. Every observant worker must have noticed at some time or another, and in the same retort-face, header-bricks standing up better (or worse) than the stretcher courses. If this means anything at all, it is a pointer that the manner of moulding and process of manufacture have an improving effect upon the qualities of the special to resist better the complexities of the conditions within the retort. If this embryonic knowledge be accepted, then, when ordering the specials, the side of the special which forms the retort-face should clearly be made known, so that the manufacturers, their pattern makers, their moulders, and their furnace men may know at all times which particular face is required to be the best face of the brick and which face should at the psychological moment be gently stroked to a good skin-finish, when I have no doubt that the advantage of porosity in the body of the brick will be married to the advantages of density and smoothness of skin of the retort face, to which scurf will find greater difficulty in penetrating and in turn tending to less flaking.

Permeability of the retort-side (the retort not beiug a monolithic structure) is a factor of the joints, and as flaking commences (or is more severe) at the joints, they may be said to be the weakest link in our armour against flaking. Joints are a function of the contractor's sphere, and as these joints are universally grooved and tongued, it would appear, at first sight, that no comment was really necessary. This, however, is not so, as contractors hold views diametrically opposed, some building tongues uppermost and some grooves uppermost, and as both methods cannot be the better, it is well to dwell a moment on this elusive, but important, point. Examining the plaster cast of flaked retort sides, which were exhibited at the 5th Autumn Research Meeting (see also fig. 27), it will be observed that the brickwork is built groove uppermost.

Historically considered, grooved and tongued joints originated with woodwork for the express purpose of rendering the structure less permeable to the passage of wind and wet. In vertical retort construction grooved and tongued work is designed for precisely the same function —*i.e.*, to render the retort wall less permeable to the passage of gas and fluxes. Taking the analogy further, a carpenter, when fixing his grooved and tongued woodwork, would unerringly place the groove pointing downwards so as definitely to prevent the lodgment of rain-water or damp in the groove. Hence similarly in retort construction the groove should point downwardly, so as to be self-emptying of all insidious minute damp fluxes or impalpable flue dust.

Leaving the chemical for the mechanical viewpoint, there is much to be said as to the advantage of building with the grooves pointing downwards, as:

(1) The brick chippings cannot as easily find lodgment on the upstanding tongue, to spoil (or render wide) the joint about to be made.

(2) Such chippings as may have come to rest on the bed-joint are much more easily brushed from the upstanding tongued face.

(3) It being difficult to dress a brick close up to the root of the tongue, it is easier and quicker in practice (connoting better workmanship) to dress the grooved face of the special.

Thus, if grooves be built downwards, the cutting is on the easier grooved-side of the special yet in the hands of the retort-setter, whereas if grooves be built upwards (fig. 27), then the retort-setter cannot, of course, cut the easier face of the special just laid with green jointing, and must perforce dress the special in his hand, or its more difficult tongued face.

In conclusion, if "To Research is To Learn," then I submit for the consideration of all researchers that there is an all-round, if slight, advantage in (1) gas-tightness, (2) maintenance, (3) economy of construction, in building with grooves downwards. Further, if the Institution's Research Chemists (who have the unique advantage of inspecting impartially hundreds of retorts of different makers) would take notes of the manner of building the grooved and tongued work, we should in all probability, in course of time, have statistical proof not only of which is the better method, but information of great value, which is the *raison d'être* of this contribution.

Reply of Mr. A. T. Green.

In the first place, I must thank all who have taken part in the discussion for their encouraging comments on the progress of our investigations. These comments in the main have been concerned with the more industrial aspects of the Report, particularly with the flaking of vertical retorts. I have obtained the impression that the very interesting contributions of Mr. Copp, Mr. Carder, and Mr. Mitchell serve to amplify the arguments contained in the Report. All appear to be agreed on the necessity for the careful control of the scurfing operation, wherein lies the probable practical solution of flaking troubles.

Mr. Frank West, who is the Vice-Chairman of the British Refractories Research Association, has given a happy introduction to the discussion. His continued interest and support are the source of much gratification to Dr. Mellor and the research staff. His reference to our participation in the Institution's American tour is opportune, and I can endorse fully all that he says. In passing, may I say that our President proved himself a wonderful leader.

I am very appreciative of Mr. Copp's contribution, and also of his help in our investigations. During my visit to his plant I was informed of the interesting observations on the nature of flaking made by the technical staff at Hull. In all probability, these observations will be again checked in future examinations of cold retorts. However, I do not think that this knowledge will influence our emphasis on the necessity for careful scurfing, or our present ideas on the mechanism of flaking. Mr. Carder's experience forms an important corroboration of our work.

Mr. Rhead's comments are invariably of a friendly and helpful nature. On a number of occasions he has given me the advantage of his opinions and experience. For instance, I must mention that after we had commenced our work on the addition of silicon and aluminium to hot-patching cements he kindly placed at our disposal some of his reports indicating the nature of his experiments in this field. In his discussion of the flaking of the retorts, he asserts that his attitude is one of "sitting on the fence." However, one suggestion which he makes will form a valuable help to us in our future investigations.

I agree with Mr. Mitchell that the scurfing operation is a very difficult one. In fact, its significance has only been adequately realized during the last four years or so. I am glad that it is not my job to draw up schedules for scurfing. In all probability such a schedule will vary for different retorts and different coals. I am definitely of the opinion that the type of scurf and its adhesion varies considerably in different plants. Consequently, the difficulty of removing it varies from plant to plant.

Mr. Toogood in his written contribution gives to the Institution the benefit of his extensive experience. Speaking for myself, I shall be pleased to follow some of his instructions in future examinations of retorts, and, therefore, to study the advantages or otherwise of (*a*) gas tightness, (*b*) maintenance, (*c*) economy of construction in building with the grooves downwards. Probably his comments will be read with interest by manufacturers of refractory materials; it is their business to assess the practicability of his suggestions concerning the porosity of retort material.

Private Bills for 1934

Provisions Relating to Gas.

Brighton, Hove, and Worthing Gas Company.

The objects of this Bill are " to prohibit the making by Housing Authorities of conditions as to the form of light, heat, power, or energy to be supplied or used in certain cases in the limits of supply of the Company, and for other purposes."

The preamble refers to the fact that the Company was incorporated in 1839 to supply gas within the County Borough of Brighton and parts of East and West Sussex. It refers to the fact that Local Authorities in those districts have provided, or are providing, housing accommodation for the working classes, and are in some cases requiring that " electricity should be used in dwelling-houses so provided by them to the exclusion of gas, and do not accept as tenants of such dwelling-houses persons who will not undertake to pay a standing charge for a supply of electricity, whether such supply be required or not."

It is suggested that it is inexpedient that occupiers of such houses should be deterred from obtaining gas if they desire it, and the Bill accordingly seeks to restrict the Housing Authorities on precisely the same lines as in the South Metropolitan Gas (No. 1) Bill.

[*Parliamentary Agents : Sherwood & Co.*]

Darlington Corporation.

This Bill is to extend the boundaries of the County Borough of Darlington with regard to their gas undertaking, and for other purposes. In Clause 30 it is provided that the ordinary gas charges of the Corporation shall from April 1, 1935, be applicable to the new area which the boundaries of the Borough are to include.

Part III. of the Bill contains miscellaneous provisions relating to the gas undertaking.

[*Parliamentary Agents : Lewin Gregory & Co.*]

London Passenger Transport Board.

In a Bill to empower the London Passenger Transport Board to provide services of trolley vehicles, provisions are included for the protection of gas and water interests. Before work is begun in any street or road under which mains are situated, the Board are to deliver to the undertakers a description of the works proposed, and how they are to be carried out. If the undertakers think necessary, they may give notice to the Board to lower or otherwise alter the position of apparatus, or support it temporarily in some manner. All such protective work is to be carried out at the expense of the Board, but to the satisfaction of the engineer of the undertakers.

The undertakers may appoint watchmen or inspectors to supervise the work, and their reasonable wages shall be borne by the Board. If any interruption in the supply of gas, &c., shall be caused by the works, the Board shall pay to the undertakers a sum of £10 an hour during which the interruption continues.

[*Parliamentary Agents : Dyson, Bell, & Co.*]

Manchester Corporation (General Powers).

This Bill, which is to empower the City of Manchester to make various improvements and for other purposes, lays down new provisions regulating the sale of coke.

In Clause 86 the application of surplus gas revenue is dealt with. It is provided that, in addition to purposes named to which a sum not exceeding the excess revenue may be applied, the Corporation may apply it in part or whole, to an extent not exceeding £400,000 in the aggregate, towards the provision of a fund for working capital. The annual amount, however, is not to exceed £40,000.

The amount to be applied in any year to the reserve fund is not to exceed ½% of the outstanding debt.

[*Parliamentary Agents : Sharpe, Pritchard, & Co.*]

Middlesex County Council.

A Bill to confer numerous additional powers on the Middlesex County Council contains a clause by which the Council seek the functions of an Urban District Council, so far as power to require gas and water pipes to be moved is concerned.

[*Parliamentary Agents : Sharpe, Pritchard, & Co.*]

Sheffield Gas Company.

The preamble of this Bill refers to the fact that there are within the Company's limits of supply coke-ovens producing a surplus of gas, and that the Company have powers to lay mains to enable this surplus to be made available. The Act of 1931 was obtained with the assent of the owners of the coke-ovens within the limits, and made binding an agreement between the Company and the South Yorkshire Gas Grid Company. The Sheffield Company spent large sums of money on the provision of mains, and are about to spend further sums, and they are required to supply coke-oven gas to other statutory gas undertakers within the coke-oven gas limits. It is pointed out that the full realization of the purposes of the 1931 Act will be prevented if coke-oven gas is supplied within the Company's limits other than by the Company.

The Bill accordingly proposes to restrict the supply of coke-oven gas within the Company's limits of supply to the Company. It is laid down that no person, except with the consent of the Company, shall supply such gas within their limits, subject to the proviso that nothing in the Section shall authorize the Company to give their consent to the supply of coke-oven gas in any area jointly covered by their and the Rotherham Corporation limits (except with the latter's approval). It is also provided that nothing shall prevent the latter Corporation from supplying coke-oven gas in any area in which they are empowered to supply by any previous Act, or affect the operation of Section 41 of the Stockbridge Gas Act of 1919. The restriction will also not apply to the supply of compressed coke-oven gas in portable containers.

[*Parliamentary Agents : Rees & Freres.*]

South Metropolitan Gas Company (No. 1).

This Bill has for its main object to prohibit the making by housing Authorities of conditions as to the form of light, heat, power, or energy to be supplied or used in certain cases in the limits of supply of the South Metropolitan Gas Company, who supply gas to a large part of the County of London on the south side of the River Thames and in parts of Surrey and Kent. Local Authorities in these districts are fettering the choice of their tenants as to the form of light, heat, &c., to be used in their dwelling houses; and it is suggested that it is inexpedient that the occupiers of houses erected out of public funds should be prevented from obtaining a supply of gas or restricted as to the purposes for which they may use gas supplied to them, or that the Company should be hampered in developing their undertaking in the general interest of those within their limits of supply.

The operative clause of the Bill states that the Housing Authority shall not, in connection with any of its sales or leases of houses or land impose any restrictions on the form of light, heat, power, or energy to be supplied or used or impose any conditions as to the taking from any particular local authority or company of any form of light, heat, power, or energy. It also seeks to prevent them from giving any preference to any person on account of his agreeing to take any particular form of light, &c.

It is sought to stipulate that any condition or restriction imposed, whether before or after the passing of this Bill, shall be of no force or effect. The provisions of the Bill are not to apply to any reasonable term or condition as to the position in any room or other part of a building of any fittings required for the use of any form of light, &c.

[*Parliamentary Agents : Sherwood & Co.*]

South Metropolitan Gas Company (No. 2).

This Bill is to amend the enactments relating to prepayment meters. The Company are required, under their Act of 1932, to calculate the charge for the hire of any meter and fittings according to the number of therms supplied, and it is thought that it would be advantageous in many cases for consumers to pay for the hire thereof of a periodical sum of money not so calculated.

The Bill accordingly lays down that the Company may, with the consent of the consumer, make such periodical charge.

The Bill also provides that the Company may fix, repair, and remove pipes and fittings in connection with the consumption of gas, supply materials therefor, and make charges upon agreed terms.

[*Parliamentary Agents : Sherwood & Co.*]

Stockport Corporation.

In Part III. of the Bill it is provided that the Corporation's gas supply limits shall be extended to include so much of the parish of Poynton-with-Worth as is not already within their limits. The Corporation may, after the passing of the Act, acquire from the Poynton Colliery Company, Ltd., or any other owner, the Poynton Gas-Works.

It is also provided that gas fittings let out on hire-purchase by the Corporation will be deemed to be " fittings let on hire " by them. In any proceedings taken by the Corporation to recover sums due in this above connection, the cost of the work in fixing, setting-up, altering, repairing, or removing may be included.

[*Parliamentary Agents : Lewin Gregory & Co.*]

Stockport Extension Bill.

The object of this Bill is to extend the boundaries of the County Borough of Stockport.

It is provided that the limits within which the Corporation are empowered to supply gas shall be extended to include Cheadle and Gatley and the remaining part of Poynton-with-Worth. The Cheadle and Gatley districts will henceforth cease to be

within the limits for the supply of gas from the City of Manchester. The Stockport Corporation will purchase from the latter their gas undertaking in these districts; at a price to be determined by arbitration under the Act of 1889. The Corporation will only take over the Poynton-with-Worth gas supply after obtaining the consent in writing of the owners of Poynton Gas-Works.

It is also provided that as from June, 1935, the prices to be charged for gas by the Corporation in the new areas taken over shall not exceed the prices charged in similar circumstances in the existing Borough.

[*Parliamentary Agents : Lewin Gregory & Co.*]

Wantage Urban District Council.

It is proposed to alter the provisions with regard to surplus gas revenue. If in any year the accounts of the gas undertaking show the revenue has exceeded the total amount of payments and expenses in respect of the year, then, if the reserve fund does not amount to more than 1/20th of the capital, an amount equal to that excess shall be considered as revenue of the undertaking for the next year, and a reduction will be made in gas charges so as to be reasonably equivalent in the aggregate to the excess in question. If the reserve fund amounts to more than 1/20th of the capital, then such amount as the Council think fit shall be held to be revenue in respect of the next year, and a reduction be made in gas charges as nearly as possible equivalent to the amount so deemed to be revenue.

[*Parliamentary Agents : Lees & Co.*]

PROVISIONAL ORDERS.

Edinburgh Corporation.

It is provided that the Corporation shall not be bound to give or continue a supply of gas unless the person supplied has deposited, if required, sufficient security for the sums of money which may from time to time become due to the Corporation. The deposit shall not exceed 50% of the annual charge, estimated by the engineer of the gas undertaking as likely to be consumed in the premises. If a person has paid his bills regularly, he may after five years apply for the return of the deposit, and the Corporation must return it, without prejudice to their right to demand another deposit at some future date. Interest is to be paid on deposits of 10s. or over at the rate of 3%. If a deposit remains in the hands of the Corporation after a person has ceased to take a supply of gas and electricity such person or his representative may appropriate it.

[*Parliamentary Agents : Beveridge & Co.*]

Glasgow Corporation.

There is a clause in this Order to the effect that the Corporation may enter into contracts and agreements with persons for the supply to the Corporation of gas produced in coke-ovens and by other means. The Corporation seek powers under this clause to place, repair, and remove mains and pipes, either within or beyond their limits for gas supply, subject to the provisions of the Gas-Works Clauses Act of 1847.

[*Parliamentary Agents : Martin & Co.*]

Supply Safeguards

By H. C. Widlake, Assoc.M.Inst.Gas E., A.M.I.E.E., A.M.I.Mech.E.

Under this heading the author proposes to discuss the manner in which warning devices can be used for the purpose of giving timely notice of irregularities in the functioning of gas supply systems. Gas engineers of the old school might probably be justified in condemning devices of this class as "unnecessary gadgets" but under present-day conditions they are essential if the Gas Industry is to continue to enjoy that reputation for reliability which may rightly be described as its heritage, bequeathed by generations of capable public servants.

Up to a few years ago the residential districts of the average provincial town were confined to the immediate suburbs, and lack of suitable transport was an insuperable bar to residence at any considerable distance from one's place of employment. To-day, however, the advent of the motor car and motor cycle has removed this disability, while country areas which the town dweller once regarded as inaccessible have now been brought into close touch with neighbouring towns by rapid and frequent motor 'bus services.

As the natural result of these modern facilities for rapid travel, large communities have sprung up in suburban areas, and gas suppliers have not been slow to recognize the possibilities of the domestic demand thereby created.

It is no exaggeration to state that the future of many an undertaking depends on the care with which this suburban demand is anticipated and catered for, and a rich harvest may be reaped providing those in authority do not miss their opportunity.

The static process by which in the past it has been possible to maintain an adequate pressure in the old districts of supply is of very little use under the new conditions which have to be met, and most gas suppliers are finding themselves in the position of having to use running plant in order to fulfil their obligations to at least a portion of their consumers. Moreover, that percentage of total output handled over running plant is steadily increasing, and the old confidence, engendered by a system of static distribution, can no longer be enjoyed by those upon whose shoulders rests the responsibility for uninterrupted gas supply.

The training of a modern gas engineer is fairly comprehensive, but, a course in prophecy not being included in his syllabus of studies, most undertakings have to endure a transitory period in which the distant demand is met by connection to the old area of supply, and peak loads are handled by the use of boosting plant sited either on the works or on the fringe of the old area.

Eventually, with the increasing demand in the remote districts, these provisions are seen in their true perspective as temporary expedients, and there comes into existence a high-pressure system, and a general re-grouping of the entire area of supply is undertaken as a matter of course.

Warning Signals.

By whatever stages a permanent scheme is ultimately reached, the result is the same. The continuity of supply to a certain, and generally an increasing, number of consumers has become dependent upon the uninterrupted working of some power driven unit of plant, and the question naturally arises as to whether it is possible or practicable to set up a system of safeguards to furnish timely warning of any irregularity in the working of that plant.

Safeguards are definitely valuable features in connection with the operation of vital units, but it is essential that the person responsible for their selection and manner of use shall be closely familiar with the operating details of the installation concerned.

It is also necessary to take into account the psychology of the plant attendants and their probable reactions to the presence of devices which naturally tend to relieve them of some measure of their personal responsibilities. Too much attention cannot be given to this factor, as far more irregularities in plant operation are attributable to the human element than to faults in structure or design.

The Human Element.

Failure on the part of plant attendants to carry out their duties in a conscientious manner is a frequent cause of irregularities, and probably the most difficult to anticipate and guard against.

The problem of the square peg in a round hole is as old as the hills and is often in evidence on works where an attempt is made to operate modern plant with men whose experience and sympathies lie with an earlier and simpler order of things. As a matter of fact this circumstance can hardly be dignified by the title of "a problem," the solution being so obvious. Where vital issues are involved there is emphatically no room for square, or even slightly oval, pegs in round holes, and the sooner they are eliminated the better for all concerned. It is essential that the men selected for handling important units of plant should be chosen with due regard to experience, health, temperament, and general suitability for the particular duties concerned.

Many regrettable incidents could be cited in which the direct cause of failure lay in the fact that the individuals concerned were temperamentally unsuited to the duties which they were required to carry out.

However carefully men may be selected for duty in key positions it is unwise to place too much reliance on the continued proper functioning of the complex organization

which we term the human machine, and the necessity for some form of human or mechanical supervision is indicated.

Graphic Recorders.

Graphic recorders, properly applied and maintained, are far more effective than many forms of human supervision. When an inquiry into some irregularity in the working of plant has to depend upon the statements of operators it is necessary to accept such evidence with a certain degree of reserve. The relations between men accustomed to work together are rarely impersonal, and their statements are generally biased to some extent. Also, when the human element is responsible for the trouble there is a natural tendency to cover up something, and the investigator finds himself faced with statements which he knows, but cannot prove, to be lacking in some vital fact.

Even if personal bias, reservation, and mis-representation could be eliminated in these matters, the fact remains that sudden emergencies induce a state of tension and excitement which impair the powers of observation and so detract from the value of the report subsequently made.

In contrast to the conflicting reasons which discount the value of personal evidence the information afforded by a recorder chart is impersonal, unbiased, and definitely related to a time base. It furnishes a true record of running conditions, and of sins of omission and commission, always providing, of course, that the recorder is kept locked. If a chart is accessible to the attentions of the would-be "faker," a very little manipulation will result in the trail being obscured by the number of "red herrings" drawn across it.

A faked chart can generally be detected by scrutiny under a magnifying glass, but a lock on the door is far simpler and increases the value of the instrument.

If we accept the cynical definition of "conscience" as "the small voice which warns us that someone is looking," the presence of recorders can certainly be regarded as stimulants to the conscience of plant attendants.

When the old Persian Tent Maker wrote his immortal quatrain—

> "The Moving Finger writes, and having writ
> Moves on; Nor all Thy Piety nor wit
> Shall lure it back to cancel half a line
> Nor all thy tears wash out a word of it"

he little realized that, eight hundred years hence, his quaint phraseology would so aptly fit a Twentieth Century scientific instrument.

There is, about the graphic record, a finality which cannot be revoked or controverted, a characteristic which is fully appreciated by plant attendants, who, in the presence of recorders, carry out their duties more carefully and with a closer regard to exact results than is the case when no such check upon their work is provided.

As an instance of the value attaching to the use of recorders consider the case of a steam driven compressing plant, run on the throttle, and regulated according to the information afforded by either a distant pressure indicator or by reference to a pressure instruction chart setting out the varying pressures to be maintained on the outlet of compressors at all times of the day.

A recorder on the common outlet main furnishes a permanent record of the manner in which the engine attendant has carried out his duties, every variation in pressure being related to a time base, a circumstance of the greatest value when irregularities are being inquired into.

In such a plant, when the pressure line happens to fall below the prescribed value a favourite excuse is that "the steam pressure was down and caused the engine to slow up." Now a partly loaded engine, running under throttle control, is not particularly susceptible to the ordinary pressure variations in the works supply mains, but in the absence of definite information on the matter, such explanations have often to be accepted. If a steam pressure recorder were installed on the supply main it could be seen at a glance whether the period of low gas pressure coincided with a fall in the steam pressure, and the need for accepting a verbal explanation would no longer pertain.

There seems to be no reason why the manufacturers of recording apparatus should not lay themselves out to supply, at a reasonable figure, an instrument capable of graphing two functions on a common chart, in this case the steam and the gas pressure. The cost of such an instrument, with its single clock mechanism, should be much below that of two separate recorders, while the cost of chart replacements would be nearly halved.

It is true that any desired combination can usually be provided for on a common drum, but there is a tendency to regard such instruments as "specials," and their cost is often rather high.

A dual instrument of this class, graphing inlet and outlet pressures, would find a welcome in many high-pressure governor houses, and it is difficult to imagine a more comprehensive check on the working of a high-pressure system than that which two double recorders would provide, one in the governor house and the other in the engine room as previously described.

If the charts so obtained are scrutinized daily by a competent observer it is possible to detect incipient faults which might otherwise remain unsuspected until they developed into serious defects.

The arguments in favour of the use of graphic recorders in connection with the operation of compressors applies with equal force to boosting fans, which are generally brought into operation over periods of peak demands and are shut down as soon as the need for augmenting holder pressure has passed.

The maintenance of a uniform pressure at the point of use has, to-day, become an exact science, and there is no justification for the pressure disturbances which are often associated with the introduction into and withdrawal from the system of boosting plant. The smoothness with which these operations can be carried out depends upon the nature of the control gear laid down and the personal skill of the booster attendant. The use of graphic recorders will keep a close check upon the latter factor, and no boosting installation can be deemed to be complete without a recorder on the common inlet main and a separate recorder on the outlet of each fan or (in the case of duplicate installations) pairs of fans. These outlet recorders should be placed sufficiently far from the fans as to eliminate any errors due to turbulence.

Parallel Running.

The practice of working two compressors in parallel at times of maximum demand (although the peak may be well within the capacity of one machine) constitutes a very definite supply safeguard. If a single machine is working fairly close to its limit a slight drop of pressure in the steam supply main (and it must be remembered that the peak demand on compressing plant often coincides with heavy demands on the works steam system) may be easily reflected in the gas pressure on the outlet of the set, whereas, if the load is being shared by two machines such a circumstance is not so likely to prove an embarrassment, and the steam situation may be got under control without prejudice to the supply pressure.

Then again, if mechanical trouble should develop with a machine on load the possibility of being able to ease the load on the defective unit immediately by transferring it to another machine is a decided advantage and permits of the situation being controlled with much greater ease than would be the case if a standing machine had to be thrown in and rushed up to load.

The practice of running in parallel may lead to a small increase in steam consumption, but the time during which machines are in parallel is relatively small and the additional security gained far outweighs this slight disadvantage. The extent to which parallel working should be practised depends, of course, upon local conditions which may, in themselves, constitute supply safeguards, such as the respective capacities of the high-pressure containers at the works and of the district high-pressure mains, and the margin of pressure maintained on the inlet of the district governors.

In the case of boosting fans the possibility of parallel working is quite another matter. When fans can be so operated the advantages are the same as in the case of compressors, but the possibility of working in this manner depends upon the design of the impellers and the characteristics of the fans.

Revolution Counters.

Revolution counters of the integrating type are valuable and inexpensive accessories in connection with the working of compressing plant. Fig. 1 shows a drawing of such an instrument designed and used by the author for speeds up to 500 revolutions per minute. The main portion, the hanger (1) is a heart-shaped casting bored to take two $\frac{1}{4}$-in. ball bearings (2) and carried on a $\frac{1}{4}$-in. spindle tapped into the end of the engine shaft. On the side of the hanger an ordinary cyclometer (3) is clamped and gear-driven from the spindle by a pair of Meccano reducing spurs (4). In operation the excessive under-weight of the hanger keeps it in a vertical position and the rotary motion of the spindle is communicated to the cyclometer by the Meccano gears.

The number of revolutions of the engine shaft over a given period is found by multiplying the difference in the index readings by a factor which takes into account the ratio of both the cyclometer and the driving spurs. The index readings are entered in the engine room log book every half hour, and afford a valuable record of the engine revolutions in relation to the load on the compressor.

If desired multipliers can be used for ascertaining piston

speed or the volume of gas compressed, the latter being based on the maker's curves relating volumes and pressures.

The index readings, regularly logged, are of particular value in the detection of mechanical faults leading to excessive slip. If, for instance, over a given period it is noted that the difference between the logged readings are substantially greater than usual under comparable conditions of loading it is a clear indication that excessive slip is taking place, due probably to a hung-up valve or a defective piston ring, and the machine should be opened up and the trouble rectified. For such comparative purposes it is unnecessary to use any multiplier.

As an instance of the durability of this type of counter it may be mentioned that the writer has used them (suitably cased) for many years on the rear axle caps of six-ton

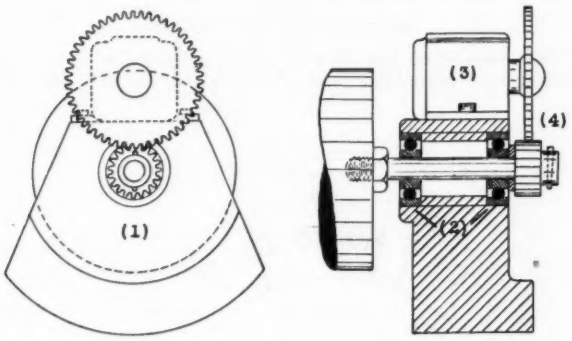


Fig. 1.

steam wagons and the only time that repairs or replacements have been required has been when the little device has actually suffered damage by collision.

The cyclometers themselves only cost 8s. 6d., the general make-up is extremely simple while the instrument is self-supporting on the shaft into which its spindle is tapped. There is generally some place about a compressing set where the device can be applied, and if it so happens that no shaft end offers itself for the purpose the counter can be mounted on a spring-tensioned lever and the drive obtained by a friction wheel bearing upon the periphery of a shaft.

Audible Warning Signals.

Audible warning signals giving notice of irregular conditions are of considerable value providing their nature and manner of use is not such as to lead attendants to regard them as a reason for relaxing their watchfulness.

Take for instance the case of a distant pressure indicator fitted with closely set minimum and maximum pressure alarms, say, at 4 in. and 6 in. respectively. The attendant's duty is to maintain, say, 45/10 at the distant point, but feeling secure in the audible warning provided he may easily form the habit of neglecting his job until the sounding of the alarm warns him that his pressures require adjusting. For this reason a bell, audible to the pressure attendant alone, cannot be regarded as a reliable safeguard and the need is indicated for an audible signal of such power as will advertise the fact that pressures are being neglected. In other words an alarm should not be only audible to the man whose neglect causes it to function.

In much the same way that a modern business system aims at the prevention of fraud by making it impossible for one single individual to carry through a fraudulent transaction, so should systems of audible alarms be so arranged as to inform more than one individual when duties are being neglected and the devices come into action.

Stoppage Alarms.

Stoppage alarms are applied to an engine shaft or to any rotary or reciprocating member for the purpose of giving an audible warning when that member ceases to function. It may be argued that in the case of a compressing plant a minimum pressure alarm fitted to a recorder or gauge mechanism would fulfil the same purpose; but this is scarcely the case.

A stoppage alarm fitted to a compressor would function immediately the machine stalled, whereas a low pressure alarm would only come into action when the pressure had fallen to some set value. Stoppages are most likely to occur at times of light loading when the compressor is turning very slowly and the capacity of both the high-pressure container on the works and of the supply mains will operate to set up a considerable time lag between the actual stalling of the compressor and the operation of a low-pressure alarm.

In other words, a stoppage alarm anticipates the fall of pressure, whereas a low-pressure alarm only comes into action when that fall of pressure has become an accomplished fact.

The illustration in fig. 2 shows a stoppage alarm designed by the writer for a compressor which, by reason of its situation, could only come under the occasional notice of its attendant. A small rotary pump (1) was chain-driven from the compressor shaft and delivered oil into a cylinder (2) mounted vertically on the discharge side of the pump. This cylinder had a vertical line of holes drilled on one side and was fitted with a piston and piston rod (3). So long as the pump was working the oil pressure forced this piston a certain distance up the cylinder uncovering such an area of holes as were necessary to permit of the flow of the oil into the small tank (4) surrounding the pump and thence back to the suction. A pair of contacts (5) were so arranged at the top of the cylinder as to come into operation only when the piston had fallen to its lowest position, which would be when the pump had stopped and there was no oil pressure available to raise the piston.

Although this device was intended primarily as a stoppage alarm it was so constructed that the alarm contacts were capable of vertical adjustment and could be set to give warning of a slowing up before an actual stoppage occurred. It will be noticed that the effect of the line of vertical holes was such as to cause the piston to rise and fall according to the speed of the engine.

This device was applied in duplicate to a pair of compressors and was fitted with a single loud bell. A change-

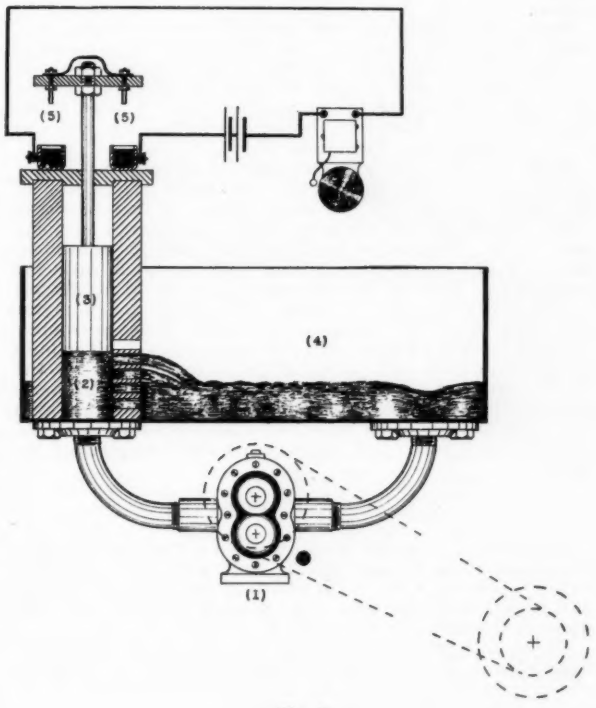


Fig. 2.

over switch (which could not be centred) was installed to transfer the bell from one machine to the other when the compressors were changed. Thus, if the attendant forgot to operate this switch after changing compressors his attention was drawn to his omission by the continued sounding of the alarm bell which had been left in association with the stopped machine.

In this connection it may be mentioned that an alarm which can be tampered with by an attendant is of no earthly use, as, sooner or later, the inevitable fool who exists on most works, discovers the weakness and for reasons best known to himself proceeds to put the device out of action.

In the case of engines working with a forced system of lubrication the stoppage alarm can advantageously take the form of a pair of contacts fitted to the gauge indicating the pressure of the lubricating oil. Such gauges can be obtained from all makers of pressure gauges and possess a

valuable dual advantage. Not only will they act effectively as stoppage alarms, but they also come into action should the oil pressure fail, a circumstance which, if undetected, will quickly lead to serious damage to the engine. With this in mind the internal contacts should be set not to zero, but at a point corresponding to some minimum oil pressure below which it is not safe to run the set.

It is scarcely necessary to add that all such devices should be periodically tested.

It is, of course, necessary to have some means for transferring the alarm from one engine to another by switching arrangements which will cause it to operate until it is associated with the running machine.

High and Low Pressure Alarms.

Most pressure gauges, whether of the recording or indicating type, can be fitted with electrical contacts for closing an alarm circuit when the pressure rises above or falls below certain predetermined maximum or minimum limits. Provided the instruments are purchased from manufacturers of established reputation there is little likelihood of these contacts becoming inoperative always providing that they are not loaded in excess of the electrical values specified by their makers.

It is essential that easy access shall be provided for the inspecting and cleaning of these contacts, and as they are necessarily of somewhat delicate construction this duty should be undertaken by some responsible member of the staff.

Alarm circuits should always be tested daily in order to prove their efficient working condition. So far as concerns minimum pressure alarms this testing is a very simple matter and can be carried out by closing the instrument cock and allowing the pointer to return to zero, when the low-pressure contacts will be closed and the alarm will sound.

Testing maximum pressure alarms is not so simple, as it is not always convenient or advisable to raise the pressure to that value at which the alarm comes into operation. It is, of course, always possible to open the instrument case and induce the rise of the pointer by finger manipulation, but this method can easily injure the instrument and can only be described as barbarous.

In fig. 3 is shown a device designed by the author to meet this need in a scientific manner without the necessity of raising the pressure in the main system to that figure at which the maximum pressure alarm is required to come into action. The meter itself is fitted with an additional cock (1) just below the zeroing cock supplied with the instrument. Between the two cocks is a tee (2) fitted with a cock (3) and communicating with an ordinary motor horn bulb (4). The method of using this device is to open the cock leading into the bulb and close cock (1). The bulb is then squeezed and sufficient pressure imposed on the instrument to cause the pointer to rise to the desired maximum position. In the case of pressures which are too high to permit of their being induced by the squeezing of a bulb a small barrel type hand pump can be fitted in place of the bulb.

Load Indicators.

The estimation of the actual load on a compressing unit, considered from the gas end, is more within the province of the technician than of the ordinary plant attendant; but it is highly desirable that some provision should be made whereby the operator can judge the load on the set.

Where compressors are electrically-driven (and incidentally compressor work is a natural steam load) a load ammeter meets the case, and such an instrument can be scaled in terms of fractional loading.

In the case of a steam-driven compressor the loading can be determined with a fair degree of accuracy by steam pressure gauges fitted on the cylinder chests and (on a condensing job) a vacuum gauge. The chest instruments indicate the pressure of the throttled or governed steam and a study of the readings will give the attendant a good idea of the work being done on the compressor and the amount of reserve power in hand.

Incidentally it may be mentioned that in a reciprocating engined electricity supply station the drivers, by reference to the chest and vacuum gauges, can judge the loading of any particular set so accurately that when switchboard instruments are defective or suspect, plant can be safely put on and taken off the station 'bus bars by estimates made in this manner.

For some obscure reason this simple provision for judging the loading of engines is frequently omitted in the case of plant supplied to gas undertakings. Pressure gauges on the high-pressure and low-pressure chests should be fitted as a matter of course and plant attendants trained to appreciate their usefulness and to interpret their readings in terms of work being performed.

Log Sheets.

A log sheet upon which all readings and circumstances bearing upon the working of the plant are entered at, say, half-hourly intervals, is an essential feature in connection with the working of boosting and compressing plants. Such records are of peculiar value when, consequent upon the development of distant areas of supply, the question of laying down plant of greater capacity arises.

Reference to the stored sheets will show the increase in load on the plant over a given period, and a definite indication as to when it will be necessary to install additional plant is provided. In the absence of such records reliance has to be placed upon the memory of plant attendants and officials, a somewhat weak foundation on which to assess future needs or to budget for new plant.

Boiler Feed Regulators.

The protection provided by the installation of automatic boiler feed regulators is of a general nature and does not only apply to those units used for sending out gas. Entrained water in the steam is responsible for more breakdowns than is generally realized, and too much faith can be placed in the protective powers of separators, steam traps, and cylinder relief cocks. These furnishings are essential features on a well laid out plant, but neither individually or collectively are they capable of handling heavy water "slugs" arising through a boiler man's carelessness.

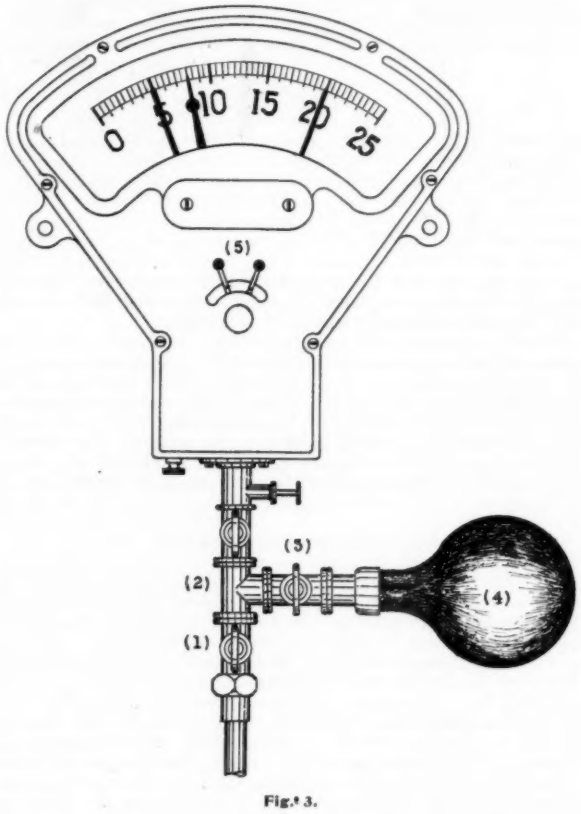


Fig. 3.

Automatic feed water regulators and high and low water alarms are not only valuable safeguards but profitable investments by virtue of the fuel economies consequent upon the maintenance of uniform water levels in the works boilers.

In this contribution the author has endeavoured to indicate on general lines the manner in which the working of vital units of plant may be reasonably safeguarded. The extent to which such devices may be profitably employed and the manner of their use depends upon the type of plant concerned and the conditions under which it is operated.

The author desires to express his thanks to Mr. R. J. H. Clark, M.Inst.Gas E., the Chief Engineer of the Plymouth and Stonehouse Gas Light and Coke Company, for permission to publish drawings and descriptions of some of the safeguarding apparatus employed on those works.

Summary of Statute and Case Law of 1933

As Affecting Gas Undertakings and Officials

STATUTES.

Finance Act.—The taxation provisions of this enactment were set out in detail in the issue of the "JOURNAL" for July 12 (p. 90), and may be summarized as follows:

The standard rate of income-tax is maintained at 5s. in the £, and the amended reliefs and allowances in force since the National Government's Emergency Budget (Finance (No. 2) Act, 1931) are continued for 1933-34 (*sec.* 27). The rates of sur-tax are unchanged (*sec.* 28); tax for 1933-34 is payable in the case of *individuals and firms* assessed under Schedules "D" and "E," in equal instalments on Jan. 1 and July 1, 1934 (*sec.* 29). This restoration of pre-1931 practice does not affect the collection of tax under other schedules, and under Schedule "D" in the case of companies, in full on Jan. 1 (Income-Tax Act, 1918 (*sec.* 157), and Finance Act, 1927 (*sec.* 21)). For the next quinquennial period the existing repairs allowances are operative in respect of properties separately assessed under Schedule "A" (*sec.* 30). The Customs and Excise Duties on hydrocarbon oils are increased by one penny per gallon, and duty is chargeable on excess stocks held on April 25 last (*sec.* 6). Variations in the licence duties payable as from Jan. 1, 1934, in respect of mechanically-propelled vehicles are provided for (*sec.* 25 and Seventh Schedule), and were set out in a tabular statement appearing on p. 304 of the "JOURNAL" for Aug. 9. As from 1934 motor licences may be obtained for lesser periods than one year in certain instances (*sec.* 26). The Stamp Duty payable by companies on their nominal capital is reduced, in the case of new concerns registered at Somerset House or of additional capital authorized subsequent to April 26 last, from £1% to 10s.% (*sec.* 41).

Municipal Corporations (Audit) Act.—The permissive powers given by the Statute are now repealed and re-enacted in the Local Government Act, 1933 (*see* below).

London Passenger Transport Act.—In the event of the abandonment of a tramway or part thereof (transferred to the Board set up by virtue of the Act), statutory gas and water undertakers within the area defined by the London Traffic Act, 1924, are given protective powers with regard to mains in highways (*sec.* 93).

Local Government Act.—The existing enactments relating to local authorities in England and Wales (excluding London—with exceptions) are consolidated and amended, and the Act comes into operation on June 1, 1934 (*sec.* 308).

VOTING POWERS OF COUNCILLORS.

The former rule that any member of a local authority who has a direct or indirect pecuniary interest in contracts or other matters under consideration at a meeting at which he is present shall be disqualified is repealed in favour of a provision (*sec.* 76 (1)) that such person shall disclose his interest in a particular contract or matter. Penalties are provided for failure to comply with this subsection (*sec.* 76 (6)), and an officer employed by a local authority is required, under penalty of a fine, similarly to disclose any pecuniary interest (*sec.* 123). Any municipal corporation whose accounts are audited by Borough Auditors may adopt, by resolution, (*a*) the system of district audit or (*b*) audit by professional accountants who are qualified for appointment by membership of one or more of the seven recognized accountancy bodies (*sec.* 239). The promotion of a Bill for the establishment of a gas or water works to compete with an existing statutory public utility *company* is especially prohibited (*proviso to sec.* 253). More detailed reference to the Act will be found in the Editorial Notes of this week's "JOURNAL."

Road and Rail Traffic Act.—As from the "appointed day" (*sec.* 49) it is an offence for a person to use a vehicle contrary to the provisions of the Act—*i.e.*, unlicenced—except as specially provided for (*sec.* 1). Three classes of licences—public carriers', limited carriers', and private carriers'—are prescribed and defined (*sec.* 2). A condition of the granting of a licence is (*a*) that the authorized vehicle is maintained in a fit and serviceable condition, (*b*) that regulations as to speed and weight are complied with, (*c*) that the restrictions imposed by sec. 19 of the Road Traffic Act, 1930, and subsequent enactments relating to the hours of drivers (including *sec.* 31 of the 1933 Act) are observed, and (*d*) that records are kept in compliance with sec. 16 (*sec.* 8).

Expiring Laws Continuance Act.—The following Acts *inter alia* are extended in operation for a further period to Dec. 31, 1934: Unemployment (Relief Works) Act, 1920, Dyestuffs (Import Regulation) Act, 1920,* and the Public Works Facilities Act, 1930.

Essex County Council Act.—This Act is noteworthy in that it recognizes the rights of statutory public utility undertakings in regard to roads and town planning (*sec.* 119 (11)).

CASE LAW.

Companies.—Where express power to issue preference shares as part of the original capital is conferred on a company by the Memorandum of Association, this power may be exercised—in the absence of any restrictive clause in the Articles of Association—by the company, notwithstanding that the Articles apply this provision only to new share capital (*Campbell v. Rofe*, Nov. 28, 1932—reported 1933—Judicial Committee of the Privy Council; A.C. 91, P.C.).

EMPLOYEES.

Neither party to a voluntary agreement, by which a former employee of a concern receives a pension conditional on not carrying on a business in competition with that of his former employers, can enforce what is in effect a contract in restraint of trade. In consequence, there is no legal redress available to the pensioner if the pension is discontinued (*Wyatt v. Kreglinger and Fernau*, King's Bench Division; 1 K.B. 793).

In a later case, this decision was distinguished, and it was ruled that a pension scheme, set up for the benefit of employees on retirement, is not invalidated in law for the reason merely that the terms of the scheme cease to apply to any pensioner who enters into competition with the business carried on by his former employers (*Horne v. Prudential Assurance Company, Ltd.*, July 19, Court of Appeal; 49 *Times* Law Reports 558).

No claim lies under the Workmen's Compensation Act, 1925, in respect of the dependent adopted child of an injured employee (*Ward v. Dorman Long & Co., Ltd.*, June 20, Court of Appeal; 49 *Times* Law Reports 512). A Bill to amend the Act in this respect has been introduced in the House of Commons (and will be read a second time in 1934 session).

It was held that the widow of a dock labourer was entitled to compensation in circumstances where the employee fell down dead while at work—despite the acknowledged fact that he suffered from heart disease. This ruling was based on the ground that death resulted from injury by accident "arising out of, and in the course of, his employment," and that there was no evidence that he would have died of his disease irrespective of the work on which he was engaged at the time of his death (*Falmouth Docks and Engineering Company, Ltd., v. Treloar*, Jan. 30, House of Lords; 49 *Times* Law Reports 250).

Where the County Court Judge found that the physical exertion of a workman's employment on the day of his death had accelerated it and caused him to die when he did, the decision in *Clover, Clayton, & Co., Ltd., v. Hughes*, 1910 (26 T.L.R. 359), was approved and applied. It was held that the work and the disease together contributed to the death so as to entitle the widow to the compensation claimed (*Partridge, Jones, & John Paton, Ltd., v. James*, Feb. 3, House of Lords; 49 *Times* Law Reports 233).

Where the employer provided a hostel for the use of workmen during intervals in their active duties, and the claimant in this action suffered personal injury by reason of slipping on an asphalt slope on the hostel premises, it was ruled that the contention of the Company—that at the time of the accident the employee owed no duty to his employer—could not be sustained, and that the award of the County Court Judge must be affirmed (*London and North-Eastern Railway Company v. Brentnall*, Feb. 2, House of Lords; 49 *Times* Law Reports 229).

A plaintiff contended that there was a breach by the defendants of two regulations of the 1925 Regulations made by the Secretary of State by virtue of sec. 79 of the Factory and Workshops Act, 1901, but it was decided

*A Bill under the same title was read a second time in the House of Commons on Dec. 18 to render the Act of 1920 permanent.

that the Workmen's Compensation Act, 1925 (*sec.* 29), relieves the employer—in the absence of any personal negligence or wilful act of the employer or of someone for whose act or default he is responsible—from liability in an action at common law in respect of an accident arising through breach of a statutory obligation imposed in the interests of the workpeople (*Rudd v. Elder Dempster & Co., Ltd.*, Dec. 16, 1932—reported 1933—Court of Appeal; 49 *Times* Law Reports 202). This ruling was disapproved by the House of Lords in the (Lochgelly) case referred to below.

It was held that a claim under sec. 19 of the Coal Mines Act, 1911—alleging failure to provide proper support for the roof of a pit—was not excluded by sec. 29 of the 1925 Act, where there is a breach of a statutory duty on the part of the employers or on the part of some person for whose act or default they are responsible (*Lochgelly Iron and Coal Company, Ltd., v. McMullan*, July 10, House of Lords).

A person who procures dangerous work to be performed on the premises of another by independent contractors assumes an absolute obligation to see that no damage results to that other person from such dangerous work (*Honeywell & Stein, Ltd., v. Larkin Bros., Ltd.*, Oct. 20, Court of Appeal; 50 *Times* Law Reports 56).

Income-Tax.

Whether a company is carrying on one or more businesses, for taxation purposes, and whether or not it has discontinued any one of its businesses is a question of fact, for final determination by the Commisioners. Where, therefore, a company claimed that there was only one business being carried on—consisting of concerns in different districts but operating from the head office of the company—the decision of the Commissioners that one business had been permanently discontinued and another set up (as from the date the new site was acquired) was upheld by the High Court (*H. & G. Kinemas, Ltd., v. Cook*, July 11, King's Bench Division).

By a majority decision it was held that the words "actual cost to that person" in sub-rule (6) to Rule 6 of Cases I. and II. to Schedule "D" of the Income-Tax Act, 1918, were used in contradistinction to "value" adopted in sub-rule (1), and that, accordingly, the former term must be interpreted as restricting the aggregate annual wear and tear allowances to the *net* cost borne by the undertaking claiming under this Rule. A (Government) Unemployment Grant towards meeting the cost of certain capital expenditure of the taxpayer must, therefore, be taken into account in arriving at the "actual cost" (*Barnes v. Birmingham Corporation*, Nov. 28, Court of Appeal). Editorial references to this case, both in the King's Bench Divisional Court and in the Court of Appeal, appear on pp. 555 (Sept. 13), 255 (Oct. 25), and 817 (Dec. 20) of the "Journal" for 1933.

The case of *Mitchell v. Noble*, 1927 (43 *Times* Law Reports 245), was distinguished, and it was ruled that a payment to the directors and sole shareholders of a company was not expenditure for the purposes of earning profits within Rule 3 of Cases I. and II., but was a distribution of profits already earned. The Commissioners had found, as a fact, that the retirement of these directors was in the best interests of the company, but the High Court decision was based on the assumption that, as the directors had sold *all* their shares (including their qualifying shares), it was not necessary for the company to offer them compensation for loss of an office which they thereupon ceased to be qualified to hold (*Overy v. Ashford Dunn & Co., Ltd.*, Jan. 26, King's Bench Division; 49 *Times* Law Reports 230).

A claim under sec. 24 of the Finance Act, 1923 (as extended by the Finance Act, 1926, *sec.* 27), to substitute an alternative basis of wear and tear allowance (which although more favourable to the taxpayer was admitted by the Inland Revenue Authorities for adoption in *future* assessments) for allowances agreed in *past* years was rejected by the High Court, on the ground that no question of law arose for the decision of the Court by virtue of the proviso to sub-section (5) of Section 24 (*Rose, Smith, & Co., Ltd., v. Commissioners of Inland Revenue*, Jan. 30, King's Bench Division; 17 Official Tax Cases 868).

The amount of the deduction authorized by Rule 5 to Cases I. and II. to Schedule "D" in the case of premises assessed under Schedule "A" is limited by the proviso to Rule 5 (2). It was held by Finlay, J., that this limitation does not apply to a dining block connected with a factory where the whole premises have been so assessed *as one unit* (*Cadbury Bros., Ltd., v. Sinclair*, Jan. 23, King's Bench Division; 49 *Times* Law Reports 208). This case is not strictly applicable to public utilities assessed under Schedule "D"—*see* editorial note "Journal," March 15, p. 671.

The decision in *Pole-Carew v. Craddock* (7 T.C. 488) that specific exemption from taxation conferred by a private Act overrides the general charging provisions or prohibitions in a general Act has been affirmed (*Commissioners of Inland Revenue v. Cadbury Bros., Ltd.*, June 28, Court of Appeal).

Although a chairman of directors agreed that after a certain date he would not accept the salary due to him until the company's profits sufficed to enable the debenture interest to be paid, it was held that an "office of profit" does not cease merely because no remuneration was received in a particular year, and, accordingly, that an assessment was properly made thereon under Schedule "E" and must be confirmed (*Henry v. Galloway*, Jan. 15, King's Bench Division; 49 *Times* Law Reports 191). The facts in this case are briefly set out on p. 671 of the "Journal" for March 15.

Rating.

It was held that in arriving at the rateable value of a public utility undertaking properly assessed for rating purposes on the "profits" basis (as approved in *Kingston Union Assessment Committee v. Metropolitan Water Board*, 1926 (Appeal Cases 331)), payments required, by statute, to be made to sinking funds—notwithstanding that they conferred no tangible benefit on the undertaking—were not to be deducted from the profits on which the assessment was based (*St. James's and Pall Mall Electric Light Company, Ltd., v. Westminster City Assessment Committee*, Nov. 9, House of Lords; 50 *Times* Law Reports 75). This affirms the decision of the Court of Appeal (1932; 49 *Times* Law Reports 159), and reverses the ruling of the King's Bench Divisional Court (1932; 48 *Times* Law Reports 533), a reference to which appears on p. 38 of the "Journal" for Jan. 4, 1933.

A new sub-station was erected in the quinquennial period, but was not expected to result in an increase in the profits of the undertaking for the time being. It was held that, whereas the undertaking had been properly assessed on the "profits" basis, the appellants' contention that the additional building should be similarly valued and assessed at a nominal figure could not be substantiated. The inclusion of a valuation on the "contractor's" basis in the Supplemental List by the Rating Authority was accordingly upheld (*City of London Electric Lighting Company, Ltd., v. Southwark Assessment Committee*, March 17, County of London Quarter Sessions).

Where a shortage in the *accounts* of the Burgh Treasurer had been allocated against the various trading departments, it was held that the amount so charged against the accounts of the gas and electricity undertakings of the municipality could not be deducted from the ratable value of these hereditaments valued on the "profits" basis (*Denny and Dunipace Town Council v. Stirling Assessor*, Sept. 12, Stirling County Valuation Court).

As the proceeds of the Gas Contingent Guarantee Rate (by virtue of sec. 38 of the Burghs Gas Supply Act, 1876, as amended by the Act of 1918) could not reasonably be regarded as in the nature of annual revenue justifying an enhancement of the rateable value of the undertaking for the particular year in which it was levied, it was held that the Assessor was incorrect in including the proceeds of this exceptional rate in the rating valuation on the "profits" basis (*Lanark Assessor v. Lanark County Council*, Jan. 26, Lands Valuation Appeal Court).

On an application for a rule *nisi* for *certiorari*, it was held that the mere presence of the County Valuation Officer during the deliberations of an assessment committee—on a proposal to amend the valuation list—is sufficient to invalidate the decision, and that this applies notwithstanding that he takes no part in the discussion and is not consulted by the Committee on any matter arising out of the appeal (*Rex v. Assessment Committee for N.E. Surrey Assessment Area, ex parte F. W. Woolworth & Co., Ltd.*, Dec. 16, 1932—reported 1933—King's Bench Division; 31 "Local Government Reports" 119). This was referred to in the "Journal" editorial columns on Jan. 25, 1933, (p. 192).

Coal.

It was held that an award of an arbitrator fixing the annual standard tonnage of a mine (under the Coal Mines Act, 1930) is final and binding for so long as circumstances do not warrant a change (*New Hucknall Colliery Company, Ltd., v. Standard Tonnage Committee and Executive Board of the Midland Amalgamated Coal Mines Scheme*, 1930, May 8, King's Bench Division; 49 *Times* Law Reports 463).

In a later case, however, it was ruled that there was evidence to show that the Tonnage Committee, in fixing the *quota* tonnage, did not comply with the Act, and allowed the Company's appeal (*Shipley Collieries, Ltd., v. Standard Tonnage Committee of the Midland (Amalgamated) District Coal Mines Scheme*, 1930, May 24; Court of Appeal).

British Sulphate of Ammonia Federation, Ltd.

Annual Report for 1932-33

The following extracts are from the Thirteenth Annual Report of the Federation.

During the year under review it is estimated that there was an increase of 79,805 metric tons of nitrogen, or about 5%, in the actual production of the forms of nitrogen enumerated below. The production in Chile decreased by 99,200 tons, or over 58% following a decline of about 32% in the previous year), and output in other countries increased by 179,005 tons, or 12½%.

The total nitrogen producing capacity in the world at the present time is estimated to be about 3,460,000 tons of nitrogen, exclusive of Chile. The " manufactured nitrogen " industry of the world thus operated at an average of about 46% of capacity.

The total consumption increased by 198,125 tons, or 12¾%, following on decreases of 4% last year and 17% in 1930-31.

The following figures are offered as fair estimates, but strict accuracy is not claimed for them:

World Production and Consumption of Pure Nitrogen for the Fertilizer Years.

[In Metric Tons.]

—	1930-31.	1931-32.	1932-33.
Production—			
Sulphate of ammonia—			
Bye-product	359,594	301,655	266,703
Synthetic	349,087	522,207	574,105
	708,681	823,862	840,808
Cyanamide	200,932	134,604	171,713
Nitrate of lime	110,585	78,939	111,163
Other forms of nitrogen*—			
Synthetic	393,150	347,812	442,168
Bye-product	30,940	29,970	28,370
Chile nitrate	250,000	170,000	70,800
Total production	1,694,288	1,585,217	1,665,022
Consumption—			
Manufactured nitrogen	1,377,005	1,417,126	1,624,209
Chile nitrate	244,300	138,208	129,254
Total consumption	1,621,305	1,555,334	1,753,463
Agricultural consumption about	1,455,000	1,412,000	1,597,000

* Including nitrogen products used for industrial purposes (except Chile nitrate) and ammonia in mixed fertilizers.

NOTE.—Fertilizers are included in these tables under the final form as sold, so that, for example, cyanamide if converted into sulphate of ammonia is included under synthetic sulphate of ammonia, or, if into ammophos, is included under other synthetic nitrogen.

Agreements with the most important Continental nitrogen producers and a tentative arrangement with the Chile nitrate industry were concluded in July, 1932, and as a result orderly selling was introduced into most of the world's markets. These agreements have been continued for 1933-34.

The nitrogen fertilizer industry thus achieved, by its own initiative and without invoking special governmental interference the objective sought by most of the world's industries in this time of depression—namely, a rise in prices. This end was attained without adversely affecting the world consumption as a whole; on the contrary, the total demand for fertilizer nitrogen increased by 185,000 metric tons, or 13%. All forms of synthetic and bye-product nitrogen fertilizers shared in the increase; the consumption of ammonium sulphate (including ammonia for mixed fertilizers) increased as compared with 1931-32 by 10½% to a record figure; cyanamide increased by 23%, and other synthetic nitrogen fertilizers by 22%. The world demand for Chile nitrate, however, declined by 6%, reaching a new low record for recent years.

On the production side, the recovery in prices has not been sufficient to check the decline in bye-product nitrogen output, which was 11% lower than last year. Works which had found it uneconomic to work up their ammonia liquor at 1931-32 prices for nitrogen products have in some cases, however, again found recovering the ammonia to be remunerative at the 1932-33 prices.

Also, largely as a result of the European nitrogen agreements in 1932-33 and 1933-34, synthetic producers have been able satisfactorily to adjust output to sales and stock requirements. The corresponding adjustment for the Chilean industry has, however, not been possible to the same extent, so that in spite of the reduction of the output to only 70,800 metric tons of nitrogen in 1932-33, it is estimated that world stocks of Chile nitrate at June 30, 1933, were about 365,000 tons of nitrogen, representing an excess above normal stock requirements equivalent to more than two years' world consumption at the present rate.

Sulphate of Ammonia.

The enormous decline in the United States' output of sulphate, due to the depression in the steel industry, was even more marked in 1932, and that country, as in 1931, remained on balance a large importer. An increase in the rate of output has, however, been noticeable since May, 1933.

The figures in the following table showing the total production of ammonia products, expressed as sulphate, are calculated on the basis of 25% ammonia (about 20·6% nitrogen). The figures for sulphate of ammonia production and trade, however, apply to actual tons of product with a nitrogen content varying from an average of about 20% in the earlier years to about 21% in recent years.

Production of Ammonia Products and of Ammonium Sulphate in Great Britain and Ireland and Channel Islands.

[Tons of 2240 lbs.]

Calendar Year.	Total Production of Ammonia Products, Expressed as Sulphate of Ammonia Equivalent (Basis 25% Ammonia).				Included in the Total.	
	England and Wales.	Scotland.	Ireland.	Total Great Britain and Ireland.	Industrial Ammonia Products (Basis 25% Ammonia)*	Sulphate of Ammonia as such (Actual Tons of Product).
1930.	730,508	69,895	3557*	803,960	89,328	678,442
1931.	595,031	54,311	3977*	653,319	86,156	524,651
1932.	726,253	42,121	3106*	771,480	85,505	628,349

* Estimated.

Home Agricultural Consumption.

Home consumption of sulphate of ammonia showed an increase on the 1931-32 figures of 10,305 tons, or 4·5%. The total, 238,643 tons, almost reached the record level of 1918-19. Sales to merchants and mixers were, in fact, 9500 tons higher than the figure shown for consumption; but as this extra tonnage represented deliveries to these buyers in the last six weeks of the fertilizer year above their usual requirements at this period of the consuming season it has been assumed that these deliveries were not for re-sale—*i.e.*, for ultimate consumption—in the fertilizer year 1932-33.

While consumption in England and Wales and in Scotland continued to progress beyond the totals for recent years, in Ireland the remarkable advance recorded in 1931-32 was not fully maintained. In view of the economic difficulties, however, it is surprising that the retrogression was not greater.

Foreign imports amounted to only 226 tons, against 14,187 tons in 1931-32. The decrease was partly due to the effect of the 20% import duty which came into force on April 26, 1932.

The total consumption of pure nitrogen in the British Isles for all purposes amounted to about 75,600 metric tons, against 74,900 tons last year. The tonnage used in industry is estimated at 17,300 tons, against 16,600 last year.

N.B.—The total consumption of Chile nitrate is estimated at 21,700 tons, as against 36,600 tons for last season.

Exports.

Total exports from Great Britain and Ireland show a decrease of 40,584 tons, or about 10·8%, on last year's figures, but during

Great Britain and Ireland and Channel Islands.

[Tons of 2240 lbs.]

Fertilizer Year.	Total Production of Sulphate of Ammonia as such.	Agricultural Consumption of Sulphate of Ammonia in—				Agricultural Consumption of Chile Nitrate.*	Sulphate of Ammonia.	
		England, Wales, and Channel Islands.	Scotland.	Ireland.	Total British Isles and Channel Islands.		Exports from—	Imports into—
							Great Britain and Ireland other than to or from the Channel Islands.	
1930–31	554,806	99,316	39,012	27,486	165,814	45,000	456,467	3,067
1931–32	600,204	133,583	40,983	44,772	228,338	33,000	375,757	14,187
1932–33	599,128	150,704	51,570	36,369	238,643	20,000	335,173	226

* Estimated.

the year there has been a further reduction in the stocks on hand in export markets.

The following figures show the shipments to the principal markets:

—	1930-31.	1931-32.	1932-33.
Spain, Portugal, Canaries	166,519	184,167	137,570
Japan	52,062	52,159	3,000
China and Hong Kong	72,206	44,314	59,817
West Indies, British Guiana, and Mauritius	16,101	22,859	30,952
India and Ceylon	21,150	35,421	48,771
Australia and New Zealand	15,151	9,498	25,869

Japan is now practically self-sufficing for ammonium sulphate.

Propaganda Work.

Circumstances were by no means favourable to the maintenance of fertilizer sales, and had it not been for the low prices ruling for sulphate of ammonia, there would probably have been a considerable fall in consumption. That an increase was obtained must, therefore, be regarded with additional satisfaction, and as proof of the inherent strength of agricultural industry.

The staff of agricultural representatives has been kept at full strength, and the desirability of increasing it is under careful consideration. It has maintained close contact with merchants, agents, and farmers, special personal attention having been given to merchants' travellers, to whom detailed information and advice on the use of ammonium sulphate has been regularly supplied.

At lectures, local cinema shows, and farm demonstrations the attendances have been highly satisfactory. At least 220 lectures, for example, have been given to a total of well over 10,000 people. The records available show that the numbers of farmers and of merchants visited during the year under review are at least as high as formerly, being estimated in the aggregate at about 15,000.

National and local advertising have been continued unremittingly. Articles, editorial comments, and other matter dealing with sulphate of ammonia have appeared constantly in the national and provincial Press.

At June 30, 1933, the Federation consistsed of 247 members, and their production for the calendar year 1932 was 92½% of all the sulphate of ammonia manufactured in the British Isles.

Yorkshire Junior Gas Association

PRESIDENTIAL ADDRESS

The meeting of the Yorkshire Junior Gas Association held at Huddersfield on Dec. 16 was the annual "President's Day," when Mr. B. Thorpe, the recently-elected President of the Association, gave his Address. By kind permission of the Chairman and members of the Huddersfield Gas Committee and Mr. H. Singleton, Engineer and General Manager of the Huddersfield Gas Department, the members met first at the Longwood Gas-Works, where they were conducted over the plant. There was special interest in this visit in the fact that it was at the Longwood Works that the Yorkshire Junior Gas Association first came into being in 1903. Motor 'buses subsequently conveyed the party to Huddersfield Town Hall, where tea was provided at the invitation of the Gas Committee.

After tea Alderman J. Mitchell, Chairman of the Huddersfield Gas Committee, gave the visitors a hearty welcome. In response to a vote of thanks to himself, the members of his Committee, and Mr. Singleton—proposed by Mr. J. W. Wood, M.Sc. (Leeds, Immediate Past-President), and seconded by Mr. A. W. Elliott (Elland)—Alderman Mitchell mentioned that he had been a member of the Huddersfield Gas Committee for 25 years.

Councillor Kaye, Deputy-Chairman of the Gas Committee, also spoke in response to the expressions of thanks.

In the absence of the Senior Vice-President (Mr. Ralph Halkett, Junr., of Sheffield), the chair at the meeting was occupied by Mr. J. W. Carlton (Shipley, Junior Vice-President).

PRESIDENTIAL ADDRESS

[Extract.]

By B. Thorpe, of Huddersfield.

The Education Scheme of the Institution of Gas Engineers owes its flourishing position to the enthusiasm of the Juniors. As a teacher in Gas Engineering and Gas Supply at two Technical Colleges in the centre of the Yorkshire Gas Association's area, I may say that Leeds, Bradford, and Huddersfield run a good second to London in forwarding and nursing the Education Scheme. During the past three years 26 students have been successful in gaining the Higher Certificate in Gas Engineering, 17 in Higher Gas Supply, 21 in Ordinary Gas Engineering, and 32 in Ordinary Gas Supply at the Leeds, Bradford, and Huddersfield Technical Colleges. I quote these results with pride, and they are all the more creditable when we regard the facilities our students have as compared with London.

It is our aim to get a Laboratory at the Huddersfield Technical College for a class in Gas Laboratory Practice similar to one at the Westminster Technical Institute. In the past I have, through the kindness of my Chief, Mr. Singleton, been allowed to have my students, on their class night for a period of six weeks prior to the national examinations, in the Works and Supply Laboratory of the Huddersfield Corporation Gas Department. I am convinced that this short course has had a very beneficial effect on the examination results. I urge that wherever Gas Classes are held some attempt should be made to institute a Gas Laboratory Class.

Sulphur in Coal.

The importance of good, clean coal for gas-making purposes cannot be too strongly emphasized. It is our practice in Huddersfield to pay marked attention to this sulphur when purchasing coal. We find sulphur present in coal in several forms, such as calcium sulphate, disulphides of iron (known as pyrites or coal brasses), and also organic sulphur compounds. As calcium sulphate can be found in the ashes of vegetation it is possible that this is the original source. From the following table you will see what a low sulphur content of coal has meant to us. All the figures are average for the month of November in each case:

—	Present.	¡s 1931.	1929.
Total sulphur content of coal, %	1·60	2·52	2·89
H_2S at inlet of purifiers, grains per 100 c.ft.	630	710	730
Sulphur compounds in town gas, grains per 100 c.ft.	18·60	30·61	36·411

Referring to the sulphur compounds figures, we must not lose sight of the fact that washing for benzole also reduced the sulphur compounds in the final gas, and the figures mentioned later show this reduction. Crude benzole recovery commenced early 1931; rectification early 1933.

It is worthy of note that this precaution with regard to sulphur in coal has had a marked effect on our purification department's costs.

Coke.

Following the address given by my Chief, Mr. Singleton, at the inaugural meeting of the session (see "Journal" for Nov. 22, 1933), further investigation has been done.

The results published showed that the use of waste gases from the retort settings could be utilized with advantage for drying coke in storage; also that a reduction of the total sulphur content of the coke was obtained. These experiments have been repeated, and similar results were obtained.

To trace the nature of the sulphur given off during the drying of the coke, a sample of breeze containing 26·82% moisture, 6·17% ash (dry basis), and 1·81% sulphur (dry basis) was boiled gently in water and neutral hydrogen peroxide for a period of twelve hours, and the following results were obtained:

Loss on Extraction (Dry Basis).	Ash (Dry Basis).		Total Sulphur (Dry Basis).	
	Before Extraction.	After Extraction.	Before Extraction.	After Extraction.
1·2%	6·17%	5·24%	1·81%	1·15%

A qualitative analysis of the extract showed the presence of iron phosphates and sulphates. The extract from the above was found to be distinctly acid, and in order to produce more useful results the experiments are being repeated on a much larger scale.

Previous investigation showed that a small quantity of the sulphur exists in sulphide, while the remainder is probably in combination with the carbon, and is extremely stable to oxidizing agents and heat.

Benzole.

A continuous benzole rectification plant, the patent of Messrs. W. C. Holmes & Co., Ltd., has been in operation at Huddersfield for the past twelve months. This is the first plant of its type, and all the investigation was done at the Huddersfield Gas-Works. The quantity of benzole recovered at Huddersfield is approximately 170 to 200 gallons per day. Hitherto continuous benzole rectification has not proved successful, but I can say with confidence that during the whole of the period we have had the plant in operation we have had very little difficulty in producing a rectified benzole which conforms to N.B.A. specification.

A brief description of the plant is as follows: The crude benzole from the continuously operated crude benzole plant passes through caustic soda in a static washer, where any phenols are removed, and then enters the sulphuric acid washer, where, by means of a pneumatic pulsating device, intimate contact between the benzole and the acid is accomplished. The acid is 87% strength and approximately 3 to 3½% acid is used. In the washer the unsaturated compounds are removed partly by polymerization and partly by solution in the sulphuric acid, and, in addition, any thiophene and thiotolene are removed. The acid tar runs through a lead pipe seal, and is disposed of as conveniently as possible. The acid benzole then flows into a separator, where any acid tar which may have been carried over settles out. The acid benzole, free from acid tar, flows into the alkali washer, and here the acid benzole is brought into intimate contact with sodium carbonate solution of 20° Tw. strength, and neutralizing is effected.

The neutralized benzole then flows through a seal to a steam-jacketed still where final distillation takes place. A small quantity of open steam is passed into the still, and this is so adjusted that, together with the closed steam, the rate of distillation conforms with the quantity of neutralized benzole entering the still. The benzole vapours and the steam pass up a fractionating column of the filled type, and the vapours are then condensed and separated from the water.

The temperature prevailing in the rectification still is approximately 96° C., and it is necessary to keep this relatively low temperature in order that any neutral esters are not broken down.

A summary of working costs per gallon of benzole taken over a period of six months in the case of the crude benzole plant and three months in the case of the crude and the rectification plant combined are shown as follows:

Crude Benzole Plant.

	d.
Value as gas	3·600
Interest and depreciation	0·311
Labour and repairs	0·372
Technical supervision	0·133
Water, steam, &c.	0·606
Cost of production per gallon	5·022

Crude and Rectification Plants Combined.

	d.
Value as gas	3·811
Interest and depreciation	0·587
Labour and repairs	0·846
Technical supervision	0·175
Water, steam, &c.	0·806
Acid	0·255
Soda	0·040
Cost of production per gallon	6·520

Typical Analyses of Crude and Rectified Benzole.

—	Crude Benzole.	Rectified Benzole.
Specific gravity at 60° F.	0·872	0·8745
Pre-formed gum. mg. per 100 ml.	..	4
Oxidized gum. mg. per 100 ml.	..	10
Sulphur percentage by weight	0·835	0·440
Range—		
100° C.	62·0%	64·0%
120° ,,	81·0 ,,	86·5 ,,
140° ,,	89·0 ,,	94·0 ,,
145° ,,	91·5 ,,	95·5 ,,

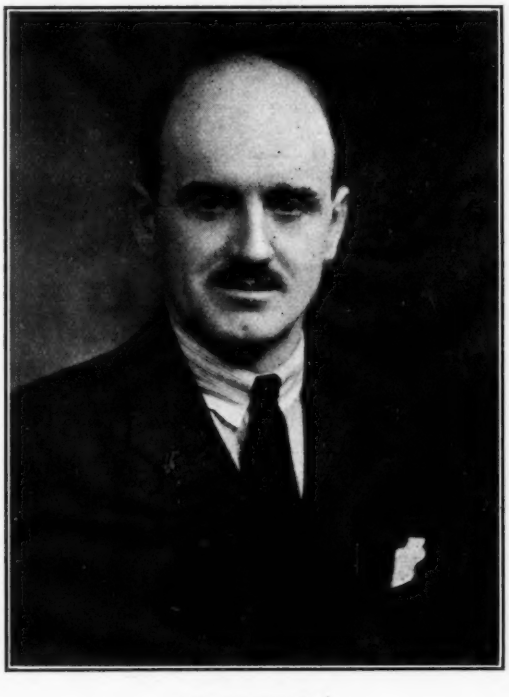
The amount of rectified benzole recovered per ton of coal carbonized during the month of November, 1933, was 0·687 gallon.

Referees' Sulphur Compounds Test at inlet of benzole washer	23·10	grains per 100 c.ft.
Referees' Sulphur Compounds Test at outlet of benzole washer	15·50	,, ,, ,,
	7·60	,, ,, ,,

It is interesting to note that tests as low as 12·5 grains per 100 c.ft. have been obtained at the washer outlet.

Vote of Thanks.

The President was heartily thanked for his address, on the motion of Mr. J. E. Wakeford (Brighouse), seconded by Mr. E. Bailey (Cleckheaton).



THE PRESIDENT.

B. Thorpe, of Huddersfield.

Mr. Thorpe, who was born at Shirland, Derbyshire, in 1901, was educated at the Brunts School, Mansfield, and was articled to Mr. J. H. Brearley, the then Engineer, Manager, and Secretary of the Longwood and Slaithwaite Gas Company. On the transfer of the Company to the Huddersfield Corporation in 1919, Mr. Thorpe's articles were transferred to Mr. H. Singleton, Engineer and General Manager to the Huddersfield Corporation Gas Department. On the completion of his articles, Mr. Thorpe was appointed Technical Assistant at the Longwood Gas Works; in 1926 he was appointed Chief Chemist to the Gas Department; and recently, in addition, to the position of Deputy Works Superintendent. He was awarded the Institution of Gas Engineers' Diploma in Gas Engineering in 1931, the Associateship of Huddersfield Technical College in 1931, and was the first recipient of the Clayton Award for the best paper read before the Yorkshire Junior Gas Association in 1932. In 1923 he was awarded the 2nd Prize in the Chemists' Section of the National Gas Exhibition, Birmingham. Mr. Thorpe has done a large amount of investigation work on the recovery of benzole, and mention of the continuously operated rectification plant is made in his Presidential Address. He is lecturer in Gas Engineering at Bradford Technical College, and in Gas Supply and Laboratory Practice at Huddersfield Technical College.

GAS MARKETS & MANUFACTURES

Stock Market Report.

[For Stock and Share List, see later page.]

The past year has been a satisfactory one from the Stock Exchange point of view. The volume of business has steadily increased with consequent rises in values, and investments generally have favoured holders. There have, it is true, been handicaps, the most outstanding of these being the fluctuations in currencies. In this connection the American situation may continue to influence markets for some time to come, but the position in this country has improved to such an extent that, under the lead of British Government securities, any reactions have been short-lived.

The position is even more favourable in the Gas Market, for with few exceptions prices have not been affected by outside influences, and a steady upward movement has been maintained throughout the year. Following the practice of former years, the lowest and highest prices of transactions during the past twelve months, excluding special bargains, have been inserted in the last column of the Stock and Share List, and it is satisfactory to note that while the lowest prices refer to business done in January last, in the majority of cases the highest are those ruling at the present time. The widest fluctuations occur in the stocks of those Companies operating abroad—viz., European with a margin of 28 points, Imperial Continental 38, Montevideo 22, and Oriental 35. In regard to the London and Suburban Companies, the price change is widest in the case of the Tottenham ordinary with 20 points. Wandsworth comes next with 18 points, Uxbridge shows 15½, Lea Bridge 15, Commercial 14, while South Metropolitan and South Suburban both have a margin of 13½ points. Gas Light units, which were changing hands in January at 24s. 9d., steadily rose until they reached their highest price in November at 28s. 4½d., when a reaction set in. This, however, has now been partially recovered, and the stock is being offered at the present time at round about 27s.

Current Sales of Gas Products.

The London Market for Tar Products.

LONDON, *Jan.* 1.

Prices of tar products generally are unchanged, and current values are as under:

Pitch is about 65s. per ton f.o.b.

Creosote, 3d. to 3¼d. per gallon.

Refined tar, 4d. to 4¼d. per gallon in bulk at makers' works.

Pure toluole, 3s. to 3s. 3d.; pure benzole, 1s. 10d. to 1s. 11d.; 95/160 solvent naphtha, about 1s. 9d.; and 90/140 pyridine bases, 5s. 3d. to 5s. 6d.—all per gallon naked at makers' works.

Tar Products in the Provinces.

Jan. 1.

The average prices of gas-works products during the week were: Gas-works tar, 25s. to 30s. Pitch—East Coast, 61s. 6d. to 64s. f.o.b. West Coast—Manchester, Liverpool, Clyde, 61s. 6d. to 64s.* Toluole, naked, North, 2s. 5d. to 2s. 7d. Coal-tar crude naphtha, in bulk, North, 6¼d. to 6¾d. Solvent naphtha, naked, North, 1s. 7d. to 1s. 7½d. Heavy naphtha, North, 10½d. to 11d. Creosote, *ex* works, in bulk, North, liquid and salty, 2½d. to 2¾d.; low gravity, 2d. to 2½d.; Scotland, 2½d. to 2¾d. Heavy oils, in bulk, North, 3¾d. to 4¼d. Carbolic acid, 60's, 2s. 1½d. to 2s. 2½d. Naphthalene, £10 to £11. Salts, 55s. to 75s., bags included. Anthracene, "A" quality, 2¼d. to 3d. per minimum 40%, purely nominal; "B" quality, unsalable.

* All prices for pitch are now quoted on the basis of f.o.b. In order to arrive at the f.a.s. value at any port it will be necessary to deduct the loading costs and the tolls whatever they may be.

Tar Products in Scotland.

GLASGOW, Dec. 30.

Very little business has been arranged during the week, and no change is expected until early in the New Year.

Crude gas-works tar.—The actual value is 40s. to 42s. per ton *ex* works.

Pitch.—This product is easy and value is lower at 57s. 6d. to 60s. per ton f.o.b. Glasgow for export, and about 60s. per ton *ex* works in bulk for home trade.

Refined tar remains unchanged at 3¼d. to 3⅜d. per gallon f.o.r. in buyers' packages.

Creosote oil.—There is a scarcity of certain grades for prompt delivery, and prices are steady. B.E.S.A. specification is 3¼d. to 3⅜d. per gallon; low gravity, 3½d. to 3¾d. per gallon; and neutral oil, 3½d. to 3¾d. per gallon—all in bulk *ex* works.

Cresylic acid.—Little or no new business is being arranged at present as works are now well sold for prompt and forward. Pale, 97/99% is 1s. to 1s. 1d. per gallon; dark, 97/99%, 10d. to 11d. per gallon; and pale, 99/100%, 1s. 3d. to 1s. 4d. per gallon—all f.o.r. in buyers' packages.

Crude naphtha.—Value is steady at 4½d. to 5d. per gallon, according to quality and quantity.

Solvent naphtha.—90/160 grade is 1s. 6d. to 1s. 7d. per gallon; and 90/190 quality is quiet at 1s. per gallon.

Motor benzole is purely nominal at 1s. 7d. per gallon *ex* works.

Pyridine.—90/160 grade is 4s. to 4s. 3d. per gallon, and 90/140 grade is 4s. 6d. to 5s. per gallon.

Benzole Prices.

These are considered to be the market prices for benzole at the present time:

	s.	d.		s.	d.	
Crude benzole	0	10	to	0	10½	per gallon at works
Motor "	1	5	"	1	5½	" " "
90% "	1	5½	"	1	6	" " "
Pure "	1	8½	"	1	9	" " "

Contracts Advertised To-Day.

Air Compressor.

Warrington Gas Department. [p. 52.]

Coal.

Buxton Corporation Gas Department. [p. 52.]

Pipes and Specials.

Richmond (Yorks.) Corporation. [p. 52.]

Retorts.

Hebden Bridge and Mytholmroyd Gas Board. [p. 52.]

Diaries, Calendars, &c.

Receipt is acknowledged of further seasonable gifts in the form of diaries, calendars, &c., from the undermentioned friends, whose good wishes are heartily reciprocated:

DAVISON & PARTNER, LTD., Westminster, S.W. 1.

DOUGALL'S GAS METERS, LTD., Chiswick Mall, W. 4.

GAS PURIFICATION AND CHEMICAL COMPANY, LTD., 34, Old Broad Street, E.C. 2.

WILLIAM GUPPY & SON, LTD., 2 and 3, Eldon Street, E.C. 2.

W. C. HOLMES & CO., LTD., Huddersfield.

LUNT BROS., Colmore Row, Birmingham.

R. & A. MAIN, LTD., London and Falkirk.

SIMON-CARVES, LTD., Cheadle Heath, Stockport.

JOHN G. STEIN & CO., LTD., Bonnybridge, Scotland.

Special Order Applications.

Sittingbourne and Milton Urban District Council.

To extend the limits of supply, to authorize the use of scheduled lands for gas purposes, and to enable the Council to borrow money.

South Molton Corporation.

To empower the Corporation to utilize scheduled land for gas purposes, to enable them to borrow money, and to confer general powers upon them.

Watford and St. Albans Gas Company.

To transfer to the Company the gas undertaking of the Rickmansworth Urban District Council, to authorize the raising of additional capital, &c.

Weston-super-Mare Gas Light Company.

To empower the Company to purchase the undertakings of the Burnham Gas Company, Ltd., and of the Highbridge Gas Company, Ltd., to utilize scheduled lands for gas purposes, and for other purposes.

INSTRUMENTS

CALORIMETERS

Simmance Patent "Positive Record" Gas Calorimeter.
Simmance Patent Total Heat Calorimeter, Sheffield Pattern.
Simmance Patent Total Heat Calorimeter, Canadian Pattern.
Simmance Patent Calorgraph.
Simmance Patent Indicating Calorimeter.
Boys' non-recording Calorimeter.
"Junkers" non-recording Calorimeter.
Also Portable Calorimeter, and Oil Calorimeter (for light oils and spirit).

SPECIFIC GRAVITY (OF GAS) APPARATUS

Simmance Patent Recording Gravitometer.
Simmance Patent Indicating and Recording Gravitometer.
Simmance Specific Gravity Bell.
Schilling's Diffusion Apparatus.

PRESSURE AND VACUUM GAUGES

Simmance Patent Dead-Beat Indicators, fixed and portable.
Simmance Patent Dead-Beat Recorders, disc-chart, fixed and portable, "Large Drum," "Light Weight," continuous tape chart, twin chart.
Batteries of Indicators and/or Recorders.
"Precision" Register, fixed and portable (float type).
Distance Pressure Gauges. King's Gauges.
Also a variety of water-tube and mercury gauges: U-tube, double-column or single-column.

LABORATORY GAS METERS AND CALORIMETER METERS

All sizes, and Automatic Stop Action Meters.

GAS ANALYSIS APPARATUS AND GAS TESTING APPARATUS

S.A.W. PATENT CO_2 RECORDERS AND INDICATORS

THERMOMETERS

For Calorimetry and Laboratory purposes.
Dial and Main, and Encased.
Flue Gas Thermometers.
Simmance Patent Indicating Thermometers, to 1000° F.
Simmance Patent Recording Thermometers, to 1000° F.

PHOTOMETERS For laboratory and portable use.

SOLID FUEL CALORIMETER "Roland Wild."

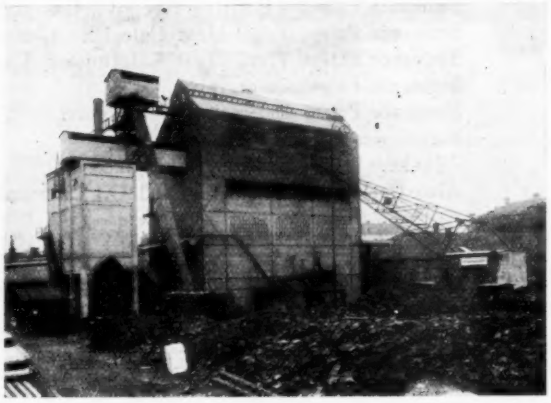
Further particulars and prices on application.

1843

ALEXANDER WRIGHT & CO LTD
1, WESTMINSTER PALACE GARDENS, VICTORIA ST.
Telephone: VICTORIA 1207
WESTMINSTER, S.W.1
Telegrams: Precision, Sowest, London

1934

Another "Repeat Order" for Glover-West Vertical Retorts



The photographs show two views of the Glover-West installation built in 1929 at the gasworks at

BRNO,
Czechoslovakia.

The new plant just ordered will bring up the estimated total daily capacity of Glover-West plant at Brno gasworks to 2½ million c.ft.

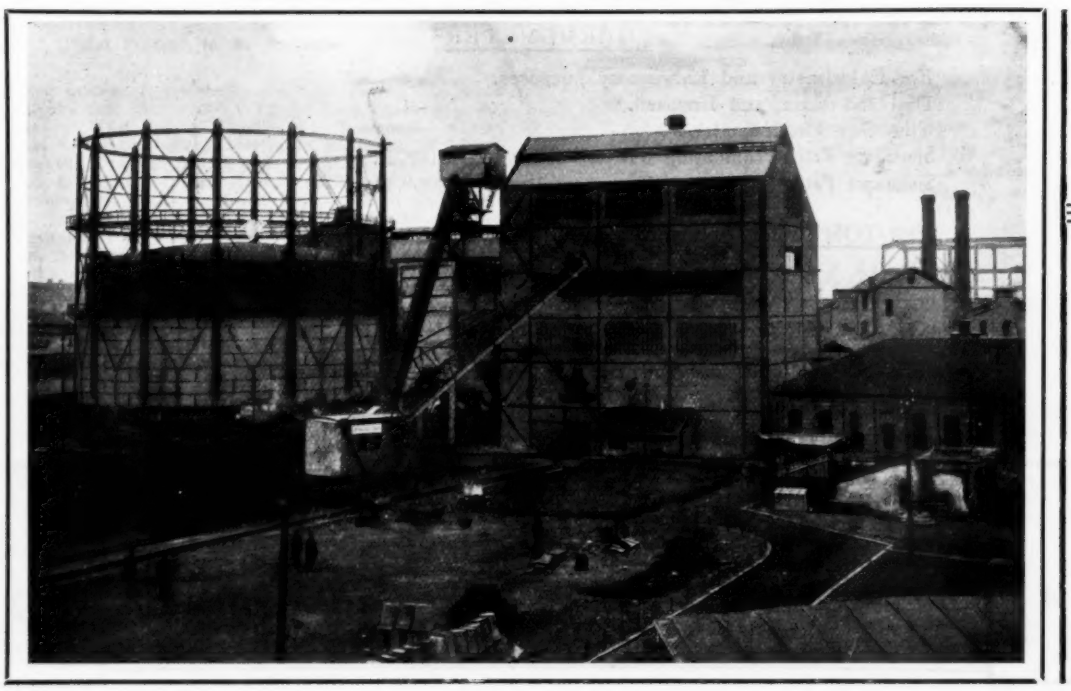
WEST'S
GAS IMPROVEMENT CO., LTD.,

MILES PLATTING - MANCHESTER - 10

Telephone: COLLYHURST, 2961 (4 lines)

Telegrams: "STOKER MANCHESTER"

LONDON OFFICE: REGENT HOUSE, KINGSWAY, W.C.2
Telephone: HOLBORN, 4108 *Telegrams: "IMVERTRET, WESTCENT."*



STOCK AND SHARE LIST.

Official Quotations on the London and Provincial Stock Exchanges.

Issue. £	Share.	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations. Dec. 22.	Rise or Fall on Week.	Transactions. Lowest and Highest Prices During the Year 1933 (‡).
1,551,868	Stk.	Oct. 9	7	7	Alliance & Dublin Ord. ...	122—132	...	111½—136⅞
374,000	"	July 10	4	4	Do. 4 p.c. Deb. ...	90—100	...	99½—99
557,655	"	Aug. 28	7	7	Barnet Ord. 7 p.c.	167—172	...	146—171½
300,000	1	Oct. 23	1/9⅓	1/4⅓	Bombay, Ltd.	26/—28/-	...	24/3—27/9
178,280	Stk.	Aug. 14	9½	9½	Bournemouth sliding scale	195—205	...	195—205
550,050	"	"	7	7	Do. 7 p.c. max. ...	163—168	...	154—167
439,160	"	"	6	6	Do. 6 p.c. Pref. ...	135—140	...	137—142½
50,000	"	Dec. 18	3	3	Do. 3 p.c. Deb. ...	75—80*	...	...
162,025	"	"	4	4	Do. 4 p.c. Deb. ...	100—105*	...	100—105½
210,000	"	"	5	5	Do. 5 p.c. Deb. ...	118—123*	...	120½—126½
357,900	"	Aug. 28	7½	7½	Brighton, &c. 6 p.c. Con. ...	160—170	...	143—168
540,000	"	"	6⅔	6⅔	Do. 5 p.c. Con. ...	147—152	...	130—151½
195,500	"	"	6	6	Do. 6 p.c. B Pref.	136—141	...	134—141
1,487,500	"	July 24	5	5	Bristol 5 p.c. max.	114—115*a*	+1	*k*
120,420	"	Dec. 18	4	4	Do. 1st 4 p.c. Deb. ...	97½—99½*a*	...	*k*
217,870	"	"	4	4	Do. 2nd 4 p.c. Deb. ...	97½—98½*a*	...	*k*
328,790	"	"	5	5	Do. 5 p.c. Deb.	119—121*a*	...	*k*
865,000	"	Sept. 25	8	7	British Ord.	155—160	...	145—162
100,000	"	Dec. 18	7	7	Do. 7 p.c. Pref.	145—150*	...	144—152
350,000	"	"	5½	5½	Do. 5½ p.c. Pref.	106—111*	...	...
120,000	"	"	4	4	Do. 4 p.c. Red. Deb. ...	95—100*	+2	97—99
450,000	"	"	5	5	Do. 5 p.c. Red. Deb. ...	107—112*	...	107—109½
160,000	"	June 26	5	5	Cambridge 5 p.c. Deb. ...	115—120	...	...
100,000	10	May 22	6	4	Cape Town, Ltd.	6⅜—7⅜	...	7—8½
100,000	10	Nov. 6	4½	4½	Do. 4½ p.c. Pref. ...	6⅜—7⅜	...	6⅜—7⅜
150,000	Stk.	Dec. 18	4½	4½	Do. 4½ p.c. Deb. ...	98—98*	...	90—100
626,860	"	July 24	6	6	Cardiff Con. Ord.	128—138	...	120—127
237,860	"	June 26	5	5	Do. 5 p.c. Red. Deb.	105—110	...	108—108½
157,150	"	Aug. 14	6½	5	Chester 5 p.c. Ord.	115—125*b*	...	110—121*b*
98,936	1	Oct. 9	2/-	2/-	Colombo, Ltd. Ord.... ...	1⅝—1⅞	...	27/6—35/6
24,500	1	"	1/4⅛	1/4⅛	Do. 7 p.c. Pref. ...	19/- - 21/-	...	19/6—20/3
609,204	1	Oct. 9	-/11'48	-/11'48	Colonial Gas Assn. Ltd. Ord.	1⅛—1⅜	...	16/74—20/9
296,053	1	"	1/3'30	1/3'30	Do. 8 p.c. Pref.	23/— 25/-	...	20/6—24/6
1,796,955	Stk.	July 24	6½	5	Commercial Ord.	122—127	...	112—126
475,000	"	Dec. 18	3	3	Do. 3 p.c. Deb. ...	74—79*	...	75—80
265,272	"	Mar. 6	—	5	Do. 5 p.c. Deb. ...	121—126	...	119—126
807,560	"	Aug. 14	7	7	Croydon sliding scale	150—155	...	141½—155
469,590	"	"	5	5	Do. max. div.	105—110	...	94—109
500,000	"	July 10	5	5	Do. 5 p.c. Deb.	120—125	...	118—126⅝
542,270	"	Mar. 6	7	10	Derby Con.	170—180*c*	...	*k*
55,000	"	July 10	4	4	Do. 4 p.c. Deb. ...	98—100*c*	...	*k*
209,000	"	Aug. 28	5	5	East Hull Ord. 5 p.c.	108—113	...	98½—110½
179,500	"	Aug. 28	6	6	East Surrey Ord. 5 p.c.	128—133	...	117—133
155,019	"	Dec. 18	5	5	Do. 5 p.c. Deb. ...	115—120*	...	115—122
1,002,180	"	Sept. 25	†7	†5	European, Ltd.	129—134	...	119—147
19,373,992	"	Aug. 14	8½	8½	Gas Light & Coke 4 p.c. Ord.	26/—27/-*f*	...	24/9—28/4½
2,600,000	"	"	8½	8½	Do. 8½ p.c. max. ...	86—89	...	82½—89½
4,477,106	"	"	4	4	Do. 4 p.c. Con. Pref. ...	102—105	...	99½—105
6,102,497	"	Dec. 18	3	3	Do. 3 p.c. Con. Deb.	81—84*	...	75½—84½
3,642,770	"	"	5	5	Do. 5 p.c. Red. Deb.	113—116*	...	113—118
3,500,000	"	"	4½	4½	Do. 4½ p.c. Red. Deb. ...	111—116*	...	108½—115
270,466	"	Aug. 28	6	6	Harrogate New Cons.	120—125	...	116½—123
82,500	"	Aug. 28	7	7	Hastings & St. L. 5 p.c. Conv.	149—154	...	130—152
258,740	"	"	5½	5½	Do. 5½ p.c. Conv.	117—122	...	108—120
140,000	1	Oct. 9	†10	1/7½	Hongkong & China, Ltd. ...	29/— 32/	...	28/9—32/9
218,200	Stk.	Aug. 14	6	6	Hornsey Con. 5½ p.c.	120—125	...	118½—126
5,600,000	"	Nov. 6	14	10	Imperial Continental Gas.	210—215	...	192—230
223,190	"	Aug. 14	3½	3½	Do. 3½ p.c. Red. Deb.	90—95	...	90—94
235,242	"	Aug. 14	8½	8½	Lea Bridge 5 p.c. Ord. ...	170—175	...	160—175
2,145,907	"	Aug. 14	6	6	Liverpool 5 p.c. Ord. ...	1294—1314*b*	...	120½—132½*b*
245,500	"	Dec. 18	5	5	Do. 5 p.c. Red. Pref. ...	101—111*b*	...	105½—107½*b*
306,083	"	July 17	4	4	Do. 4 p.c. Deb. ...	99½—101*b*	...	100½—102*b*
165,786	"	Aug. 28	10	8	Maidstone 5 p.c. Cap. ...	180—190	...	...
56,176	"	July 10	3	3	Do. 3 p.c. Deb. ...	69—74	...	71½—75
75,000	5	Dec. 4	†10	†10	Malta & Mediterranean ...	9—11	...	9—10½
892,000	—	Oct. 2	5½	5½	Metropolitan (of Melbourne) 5½ p.c. Red. Deb.	98—103	...	101—101½
231,978	Stk.	Aug. 28	5	5	M. S. Utility "C." Cons. ...	111—116	...	99—114½
818,657	"	"	4	4	Do. 4 p.c. Cons. Pref.	92—97	...	91½—98
112,126	"	June 26	4	4	Do. 4 p.c. Deb. ...	100—105	...	96—105
148,955	"	"	5	5	Do. 5 p.c. Deb. ...	118—123	...	...
675,000	"	21 May '31	†6	†6	Montevideo, Ltd.	50—60	...	39—71
2,061,315	"	Aug. 14	5½	5	Newcastle & Gateshead Con.	25/9—26/3*d*	...	*k*
682,856	"	"	4	4	Do. 4 p.c. Pref. ...	101—103*d*	...	*k*
776,706	"	July 10	3½	3½	Do. 3½ p.c. Deb. ...	92—93*d*	...	*k*
277,285	"	Nov 6	5	5	Do. 5 p.c. Deb. '48...	105—107*d*	...	*k*
274,000	"	Aug. 14	5	5	Newport (Mon.) 5 p.c. max.	101—104*a*	...	*k*
204,940	"	Aug. 28	7½	7½	North Middlesex 6 p.c. Con.	153—158	...	135½—155
396,160	"	Aug. 14	5	5	Northampton 5 p.c. max. ...	101—106	...	99
360,000	"	Dec. 4	7	†9	Oriental, Ltd.	147—152	...	115—150
316,617	"	Dec. 18	8	8	Plym'th & Stonehouse 8 p.c.	164—169*	...	147—171
504,416	"	Aug. 28	8	8	Portsm'th Con. Stk. 4 p.c. Std.	162—167	...	158—166
241,446	"	"	5	5	Do. 5 p.c. max. ...	102—107	...	100½—107½
114,000	"	Aug. 14	5	5	Preston 5 p.c. Pref.	105—110	...	106—108½
686,312	"	July 24	4	4	Primitiva 4 p.c. Rd. Db. 1911	84—93	...	80—90½
389,313	"	Dec. 18	4	4	Do. 4 p.c. Cons. Deb.	86—91*	...	81—90
150,000	10	Sept 25	6	6	San Paulo 6 p.c. Pref. ...	6½—7½	...	6½—7⅛
1,736,968	Stk.	Sept. 11	6	6	Sheffield Cons.	134—136*e*	...	*k*
95,000	"	July 10	4	4	Do. 4 p.c. Deb.	90—94*e*	...	*k*
133,201	"	Sept. 11	5	8½	Shrewsbury 5 p.c. Ord. ...	137—142	...	125—141
90,000	10	June 12	15	14	South African	8—5	...	8
6,709,895	Stk.	Aug. 14	7	5	South Met. Ord.	134—137	...	128—136½
1,135,812	"	"	6	6	Do. 6 p.c. Irred. Pf.	137—142	...	135—143
850,000	"	"	20/-*g*	4	Do. 4 p.c. Irred. Pf.	102—105	...	99½—101½
1,895,445	"	July 10	3	3	Do. 3 p.c. Deb. ...	80—83	...	75½—83
1 000,000	"	July 24	5	5	Do. 5 p.c. Red. Deb	112—116	...	110½—116
209,820	"	Aug. 14	8½	8½	South Shields Con.	170—171*d*	...	*k*
1,543,795	"	Aug. 14	6	6	South Suburban Ord. 5 p.c.	131—136	...	122—135½
300,000	"	"	5	5	Do. 5 p.c. Pref.	114—119	+1	110—121
300,000	"	"	—	4	Do. 4 p.c. Pref.	100—103	...	101½—103½
868,837	"	Dec. 18	5	5	Do. 5 p.c. Deb.	118—125*	...	119—125
100,000	"	"	4	4	Do. 4 p.c. Deb.	100—103*	...	103
647,740	"	Aug. 28	5	5	Southam'n & Dist. Ord. 5 p.c. max.	108—113	...	108—113
121,275	"	Dec. 18	4	4	Do. 4 p.c. Deb.	97—102*	...	99—104
350,000	"	Aug. 28	5½	5½	Swansea 5½ p.c. Red. Pref.	107—111	...	108½—112
200,000	"	Dec. 18	6½	6½	Do. 6½ p.c. Red. Deb.	101—106*	...	104½—108½
1,076,490	"	Aug. 14	6⅔	6⅔	Tottenham and District Ord.	149—154	...	133—153
300,000	"	"	5½	5½	Do. 5½ p.c. Pref. ...	125—130	...	122—127
62,235	"	"	5	5	Do. 5 p.c. Pref. ...	112—117	...	112—114½
199,005	"	Dec. 18	4	4	Do. 4 p.c. Deb. ...	97—102*	...	96½—101½
85,701	"	Oct. 9	6	6	Tuscan, Ltd., 6 p.c. Red. Db.	98—100	...	96½—97
347,769	"	Aug. 28	7	7	Uxbridge, &c., 5 p.ct. ...	146—151	+2	135—150½
88,830	"	"	5	5	Do. 5 p.c. Pref. ...	112—117	...	110—117
1,322,220	"	July 10	7	7	Wandsworth Consolidated	154—159	...	141—159
1,096,378	"	"	5	5	Do. 5 p.c. Pref.	118—123	...	112—122½
1,817,964	"	Dec. 18	5	5	Do. 5 p.c. Deb.	118—125*	...	119½—125
158,400	"	Aug. 28	6A	5	Winchester W. & G. 5p.c. Con.	115—120	...	110—112½

Quotations at:—*a.*—Bristol. *b*—Liverpool. *c*—Nottingham. *d.*—Newcastle. *e.*—Sheffield. *f.*—The quotation is per £1 of stock *g.*—For quarter. *h.*—Paid £3, including 10s. on account of back dividends. *i.*—The interest due 1/7/33 was paid on that date. *j.*—Excluding special bargain. *k.*—Figures not available. * Ex. div. † Paid free o income-tax. ‡ For year. Hongkong & China, Ltd.—paid on £10 shares.

COMPANY NOTICES.

THE GAS LIGHT AND COKE COMPANY.

NOTICE is Hereby Given that the TRANSFER BOOKS of this Company, SO FAR AS THEY RELATE TO CAPITAL STOCKS, WILL BE CLOSED at Four o'clock p.m. on Tuesday, the 9th day of January next, and will be RE-OPENED immediately after the Ordinary General Meeting of the Company to be held on Friday, the 9th day of February next.

Dividends payable in respect of the Half-Year ending the 31st inst. will be remitted by Warrant forwarded by post on the 28th February, 1934, to those Proprietors who were the Holders of Capital Stocks when the Transfer Books were closed, or their Authorised Agents.

By order,
WILLIAM LYLE GALBRAITH,
Secretary.

Chief Office:
Horseferry Road,
Westminster, S.W. 1,
Dec. 28, 1933.

COMMERCIAL GAS COMPANY.

NOTICE is Hereby Given that an ORDINARY MEETING of the Commercial Gas Company will be holden at the Abercorn Rooms, Liverpool Street Station, in the City of London, on Thursday, the 8th of February, 1934, at Twelve o'clock noon:

To receive the Directors' Report and the Accounts of the Company for the Year ended the 31st of December, 1933.

To declare a Final Dividend for the Year ended the 31st of December, 1933.

To elect Directors and an Auditor in the place of those retiring.

The STOCK TRANSFER BOOKS WILL BE CLOSED from the 9th of January to the 8th of February next, both days inclusive; and the Dividends will be paid on the 15th of February next to the Holders of Stock registered at the date of the closing.

By order of the Board,
F. J. BRADFIELD,
General Manager and Secretary.

Offices,
Stepney,
Jan. 1, 1934.

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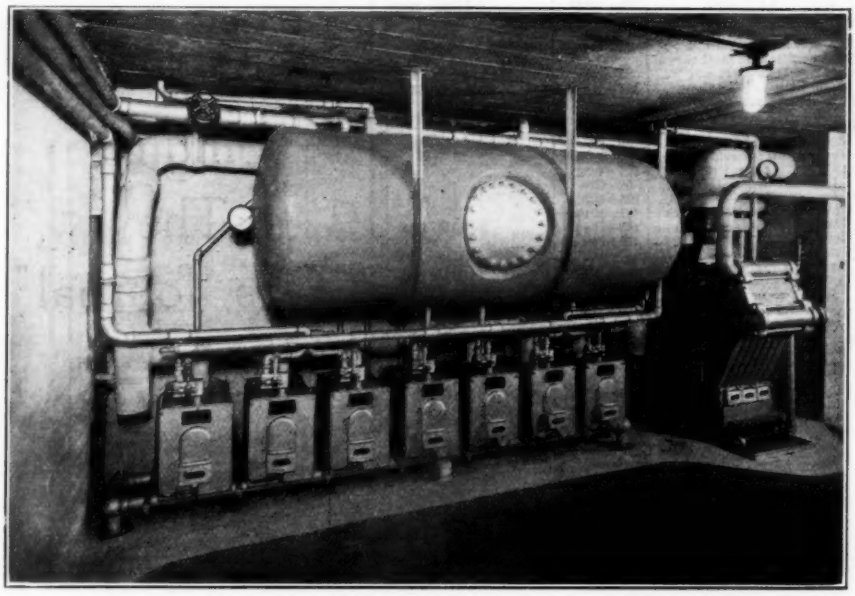

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